# Satellite tuner

Service
Service
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# Service Manual

GB 4822 727 19314

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## IMPORTANT

### NOTE 1: STATUS OF THE PRODUCT

This service manual covers both the single and dual LNB input versions of the satellite receiver with integral VideoCrypt decoder. The name and numbers of the receivers are given on the front cover.

This main PCB described in this manual is at Revision A5. The PCB's part number is marked on the component side of the PCB. This number can be read in area D1 of the component ident diagram in this manual, where revision A5 is denoted by the characters 105 at the end of the part number.

Some of the main PCBs in units in the field may be at Revision A3; this is similar to A5 but several components which were retrofitted in A3 are fully incorporated in A5.

At the time this manual goes to print, a B1 version of the main PCB is being prepared. Full details of this will be given in the next issue of this manual. The B1 version does not, however, vary much from the A5 version - some components will move slightly and the components presently retrofitted will be fully incorporated.

This manual includes information from all Engineering Change Orders (ECOs) up to and including ECO S000026 provided that these ECOs had an effectivity date on or before 23.09.92. All ECOs before ECO S000026 which had an effectivity date after 23.09.92 are not included in the main pages of this manual but may be included in the Late Changes section (see below).

Information on any further changes will be available as technical bulletins until this manual is re-issued. This manual also includes a Late Changes section (inside the rear cover of the manual) where details of any late changes, made directly before printing the covers, are included.

### NOTE 2: LARGE CIRCUIT DIAGRAM

As well as the three separate circuit diagrams relating to specific areas of the complete circuit, this manual also contains an A2 sized circuit diagram of all circuitry except the VideoCrypt circuitry. This A2 diagram is attached near the centre of the manual (just before the VideoCrypt information) so that it can be easily detached if you wish.

### NOTE 3: VIDEOCRYPT CIRCUIT DESCRIPTION AND DIAGRAM

For copyright reasons, these have been printed on special paper, part of which has been overprinted with broad diagonal stripes to prevent photocopying. Each of these sheets has a unique, traceable serial number.

# OUTLINE SPECIFICATION

## GENERAL

| | |
|---|---|
| Number of Programmes (single input receiver) | 120 |
| Number of Programmes (dual input receiver) | 199 |
| Front Panel Indicators | 3-character, 7-segment display for Standby, Timer and Programme/Channel No. |
| Front Panel Control Buttons | Standby, Programme Up, Programme Down, Authorise |
| UHF Modulator | CCIR System I, Ch. 21 to 69, preset to Ch. 38 |
| Operating Voltage | 198 - 264 V AC, 50 Hz |
| Power Consumption | 35 W (max.) |
| Dimensions | H = 66 mm, W = 360 mm, D = 210 mm |
| Weight | 2.5 kg (typical, when packed) |

## CONNECTORS

| | |
|---|---|
| TV | SCART (RGB and CVBS) |
| VCR | SCART (CVBS) |
| DECODER | SCART, Baseband Output, Audio/Video Input/Output, RGB in |
| AUDIO OUT | Phono (L and R) |
| MAINS INPUT | 2-pin reversible |
| AERIAL | IEC female |
| TV | IEC male |
| LNB | Single or dual F-type |

## TUNER

| | |
|---|---|
| Receiving Frequency Range | 950 - 1750 MHz |
| Polarity Switching | Vertical 12.6 V (±0.5 V), Horizontal 17.2 V (±0.5 V) (250 mA load) |
| Input Impedance | 75 Ω |
| I. F. | 479.5 MHz |
| I. F. Bandwidth | 27 MHz |
| Input Level | -60 dBm to -30 dBm |
| Image Rejection | 40 dB (typically) |
| Static Threshold | 6 dB (typically) |
| Energy Dispersion Removal | 35 dB (min.) |

## SCART SOCKETS

| | |
|---|---|
| Video Output Level | 1 V p-p (±2 dB) |
| Video Output Impedance | 75 Ω |
| Video Frequency Range | 25 Hz - 4.8 MHz (±1.5 dB) |
| Video De-emphasis (PAL) | to CCIR 405.1 (625 lines) |
| Baseband Output Level | 1 V p-p (±2 dB) |
| Baseband Frequency Range | 25 Hz - 10.5 MHz (±1.5 dB) |
| Baseband De-emphasis | PAL/MAC, software selectable |
| Audio Frequency Range | 30 Hz - 15 kHz |
| Audio Output Level | 500 mV rms into 600 Ω |

## OPERATING/STORAGE CONDITIONS

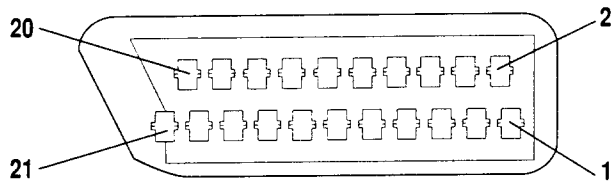
| | |
|---|---|
| Operating Temperature Range | 5 - 40 °C |
| Operating Humidity Range | 20 - 80% non-condensing at 25 °C |
| Storage Temperature Range | -20 - +50 °C |
| Storage Humidity Range | 10 - 90% non-condensing at 25 °C |

**AUDIO SPECIFICATION**

| | | |
|---|---|---|
| Audio Bandwidth | 150 kHz narrow band (mono de-emphasis PANDA 1 or 50 µs) | |
| Tuning Frequency Range | 5.00 - 9.00 MHz in 10 kHz steps | |
| Preset Stereo Subcarriers | Stereo A | 7.02 & 7.20 MHz (PANDA 1) |
| | Stereo B | 7.38 & 7.56 MHz " |
| | Stereo C | 7.74 & 7.92 MHz " |
| | Stereo D | 8.10 & 8.28 MHz " |
| Preset Mono Subcarriers | Mono 1 | 6.50 MHz (50 µs) |
| | Mono 2 | 7.02 MHz (PANDA 1) |
| | Mono 3 | 7.20 MHz " |
| | Mono 4 | 7.38 MHz " |
| | Mono 5 | 7.56 MHz " |
| | Mono 6 | 7.74 MHz " |
| | Mono 7 | 7.92 MHz " |
| | Mono 8 | 8.10 MHz " |
| | Mono 9 | 8.28 MHz " |

## PIN DESIGNATIONS FOR SCART CONNECTORS

**Socket Viewed from Rear Panel**




| PIN | DECODER SCART | TV SCART | VCR SCART |
|---|---|---|---|
| 1 | R Audio Out | R Audio Out | R Audio Out |
| 2 | R Audio In | N/C | R Audio In |
| 3 | L Audio Out | L Audio Out | L Audio Out |
| 4 | Audio Ground | Audio Ground | Audio Ground |
| 5 | Blue Ground | Blue Ground | Ground |
| 6 | L Audio In | N/C | L Audio In |
| 7 | Blue In | Blue Out | N/C |
| 8 | Ext. Decoder Status In | AV Status Out | AV Status In |
| 9 | Green Ground | Green Ground | Ground |
| 10 | N/C | N/C | N/C |
| 11 | Green In | Green Out | N/C |
| 12 | Serial Data I/O Port | N/C | N/C |
| 13 | Red Ground | Red Ground | Ground |
| 14 | N/C | N/C | N/C |
| 15 | Red In | Red Out/SVHS Chroma | SVHS Chroma |
| 16 | RGB Status In | RGB Status Out | N/C |
| 17 | Video Ground | Video Ground | Video Ground |
| 18 | Ground | Ground | Ground |
| 19 | Baseband Video Out | Video Out | Video Out |
| 20 | Video In | N/C | Video In |
| 21 | Ground (Casing) | Ground (Casing) | Ground (Casing) |

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# INSTALLATION

## Important:

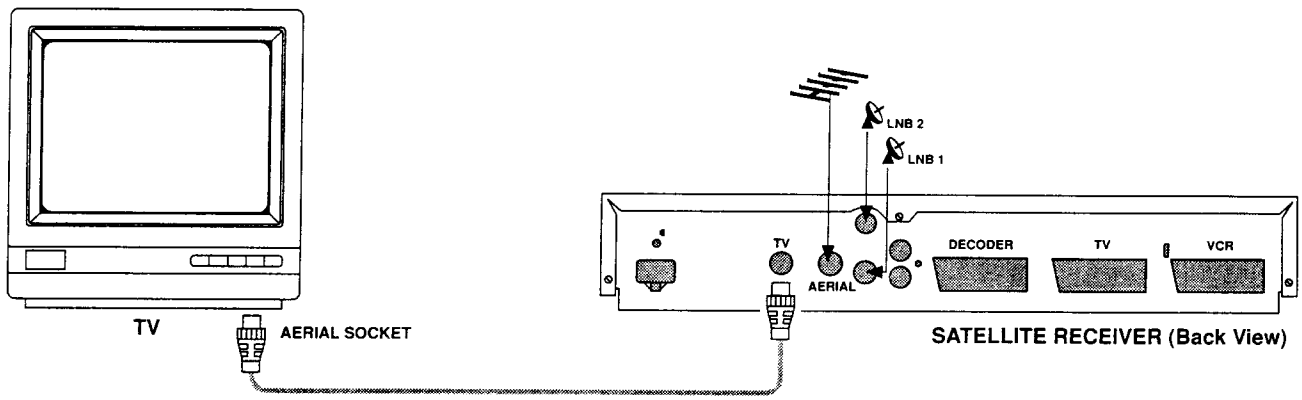
- Do not turn on the power to your receiver, TV, VCR etc. until you have made the necessary cable interconnections.
- If you want to connect a SMATV communal aerial, connect it to the LNB 1 connector of a dual input receiver; you should not connect it to a single input receiver, as on this type of receiver you cannot turn off the LNB 1 power.
- These instructions and diagrams show the UHF (TV) aerial connected to the receiver (i.e. looped-through the receiver). If you install it in this way, you should put the receiver into standby, rather than power it off, when it is not in use, otherwise you will not be able to view terrestrial TV programmes.
- You can connect the UHF aerial directly to the TV or VCR if you connect your TV to your receiver using a SCART lead.
- When you have carried out one of the installation schemes described below, refer to the Install Menu and specifically its sub-menus the UHF Tuning Menu and the LNB Install Menu. The Tuning Menu in the Programme Setup Menu contains a frequency scan option which can be used to help in the positioning of the dish aerial.
- If the receiver is connected to the TV/VCR using coaxial cable, stereo sound will not be available from your TV.
- If there is a short-circuit in the cable which connects the LNB to your receiver, the receiver will not work and may generate clicking noises.

## Connecting to a TV Using Coaxial Cable

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial to the AERIAL socket on the receiver.

Connect a coaxial cable from the TV socket on the receiver to the aerial socket on your TV.



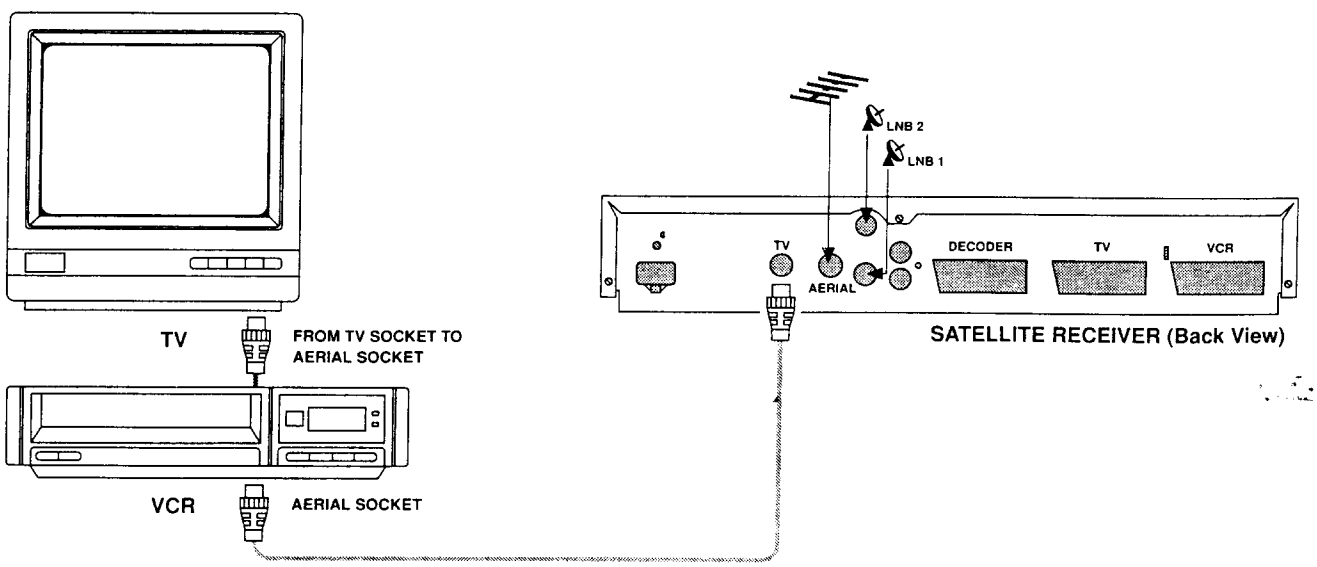

## Connecting to a TV and a VCR Using Coaxial Cable

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial to the AERIAL socket on the receiver.

Connect a coaxial cable from the TV socket on the receiver to the aerial socket on your VCR.

Connect a coaxial cable from the TV socket on your VCR to the aerial socket on your TV.

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## Connecting to a TV and VCR Using SCART Leads

Connect the cable(s) from the dish aerial(s) to the LNB socket(s) on the rear panel of the receiver.

Connect the UHF (TV) aerial either by looping it through the receiver and VCR (as shown on the previous page) or by connecting it to the TV or VCR directly (as shown below).

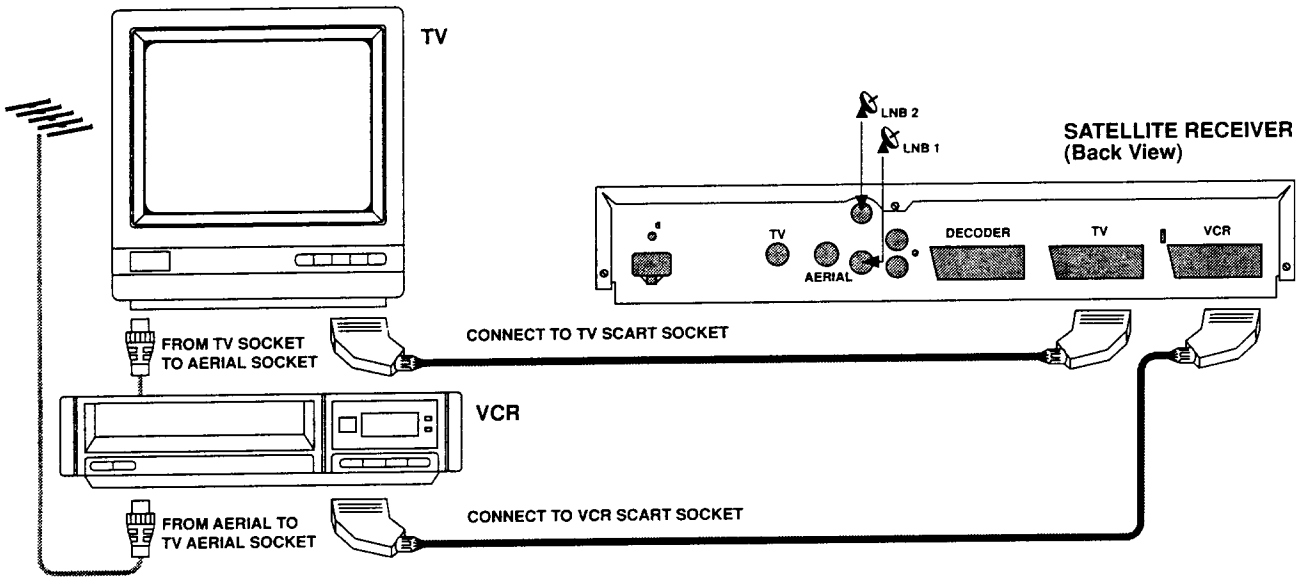
Connect a SCART lead from the TV SCART connector on your receiver to the SCART connector on your TV.

Connect a SCART lead from the VCR SCART connector on your receiver to the SCART connector on your VCR.

*NOTE: If you have connected your TV using a SCART lead, then you can use the TV/SAT key on your handset to switch between terrestrial and satellite reception, providing your TV recognises pin 8 of the SCART socket.*

*NOTE: If you have connected your VCR using a SCART lead, to record from the receiver you will need to select AUX or AV on the VCR as the programme to record. When replaying the VCR through the receiver, you will need to switch the receiver to standby mode or select TV using the TV/SAT key; this method of replaying is, however, only possible if the TV is also connected using a SCART lead.*

*NOTE: When you are using the timer function (see the Timer Menu), pin 8 of the receiver's TV SCART connector will not force the TV into AUX mode. Therefore to watch the programme while you are recording it you either need to use the coaxial cable method of TV connection, or use a SCART connection and manually select AUX on the TV.*




## Connecting an External Decoder

This receiver has an integral decoder for viewing VideoCrypt transmissions, but you can also connect an external decoder to view transmissions which have been scrambled using a different system.

Connect the decoder to the receiver's DECODER SCART connector.

Refer to the External Decoder Menu under the Programme Setup Menu to set the baseband and the audio and video source for each programme you receive via the external decoder. If the decoder does not recognise pin 8 of the DECODER SCART, then you need to set up the audio and video source to be external.

## Connecting an External Receiver

Instead of an external decoder, you can connect an external receiver to your receiver's DECODER SCART socket. For example, you might want to connect a MAC receiver so that you can view MAC programmes (as the receivers are PAL receivers). You then press the AUX/0 key to provide an auxiliary programme via which you can view the programmes you set up at the external receiver. Pressing the AUX/0 key causes the external audio and video signals from this external receiver to be routed through to your TV.

## Connecting a Compatible Dish Positioner

Connect the dish positioner to your receiver's DECODER SCART socket and refer to the Tuning Menu to set up the SATELLITE option on a per-programme basis.

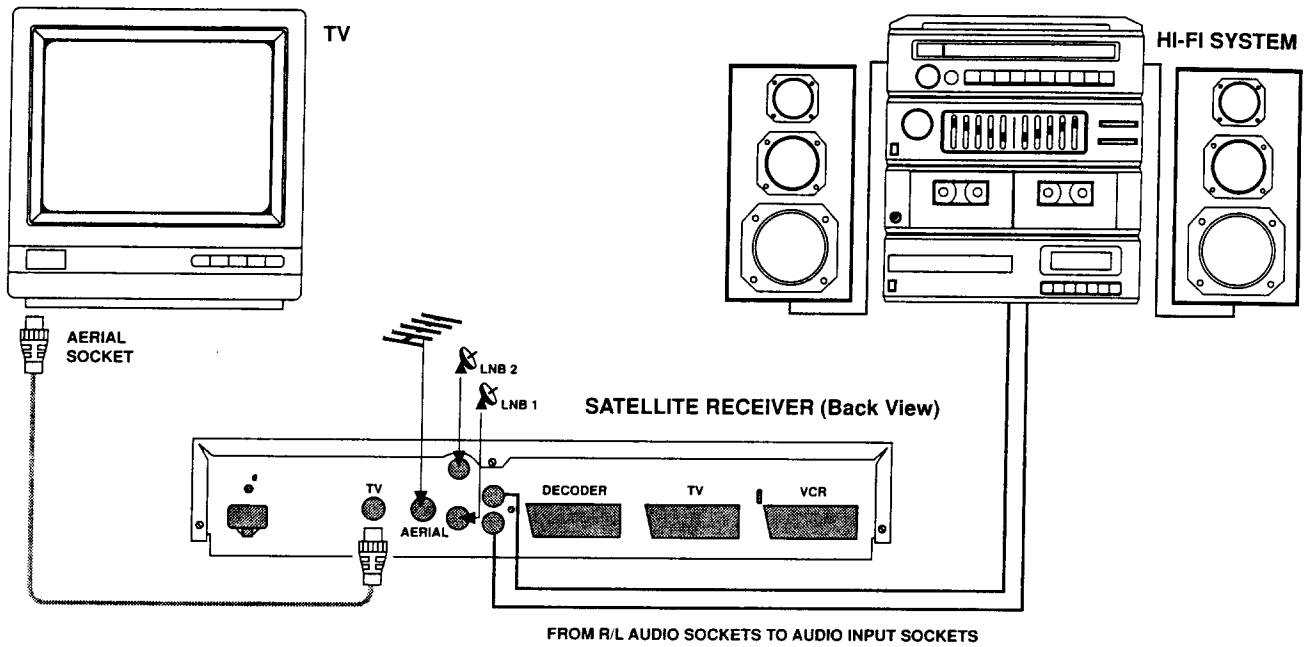
If you wish to connect an external decoder or receiver as well as the dish positioner, connect the dish positioner to your receiver's DECODER SCART socket and the external decoder/receiver to one of the decoder SCART sockets on the dish positioner.

### Connecting Stereo Equipment

To obtain the maximum performance from your receiver, we recommend that you connect your receiver to a stereo TV or to a stereo amplifier (for example, in a hi-fi system).

To connect a stereo TV, connect your receiver to your TV (and VCR, if required) using a SCART lead, as described opposite, then select AV or AUX on your TV.

To connect to a stereo amplifier, firstly connect your receiver to your TV (and VCR, if required) using either a SCART lead or a coaxial cable, as described earlier in this section. Place the speakers either side of the TV and connect the phono leads from the AUDIO OUT sockets on your receiver to the appropriate audio input sockets on your amplifier. Switch your amplifier to Auxiliary Input.




## FRONT PANEL OPERATION

The receiver is designed to be operated with your handset. Without it, you cannot display the menus or select options on them. You can, however, put the receiver in and out of standby mode by pressing the ⏻ button. You can also browse through the programmes, one at a time, by pressing the ▲ button (which increments the programme number by one) or the ▼ button (which decrements the number). The receivers also have a front panel "authorise" button (marked Ⓐ) for authorisation of programmes which may, in future, be transmitted on a pay-per-view basis.

# QUICK START INSTRUCTIONS

You can operate this receiver very easily using a simple menu structure which you access by pressing the MENU key on the handset. The following instructions need to be followed when the receiver is being used for the first time.

## SWITCHING ON AND OFF

The receiver will be in standby mode when you first power it on, unless it has been programmed to display a programme immediately (this is not recommended except for SMATV installations).

To bring it out of standby, press the ⏻ key or select a programme (see overleaf). To put the receiver back into standby, press the ⏻ key.

## UHF TUNING

After the equipment has been installed, you will need to tune in your receiver to a particular TV channel if it is connected to the TV using coaxial cable. If it is connected using the SCART connector this will not be necessary.

To perform this UHF tuning, press the F key followed by the UHF (5) key to put the receiver into UHF tuning mode.

It is unlikely that you will be able to see the UHF Tuning Menu (shown right) on the screen initially, this will appear as tuning progresses. You will see a channel number, preceded by the letter C, on the front panel of the receiver.

The factory default is for the channel number to be set to 38. Channel 38 may, however, be assigned to something else (e.g. your VCR), in which case you must set your TV to a different channel number and adjust your receiver accordingly. The TV channel you choose must be one that is clear of any other broadcasting.

You can switch on a channel scan at the menu. This will save you having to set up the TV channel number; you can simply press the numeric key on your TV handset which you wish to assign to satellite programmes and then use the channel scan to tune into the channel represented by that TV handset key.

You can also fine tune at the menu, but this feature is not often required.

**UHF TUNING MENU**

CHANNEL 38

**Press F then LEFT/RIGHT to start scan.**

**Press F then UHF for fine tune.**

### Tuning In to a Channel

Set your TV to the required channel number (in the range 21 to 69).

With the receiver in UHF tuning mode, key in this channel number using the numeric keys or use the ◀ or ▶ key to go through the channel numbers one at a time until a good quality picture of the UHF Tuning Menu can be seen on the screen.

*NOTE: If you set your TV to channel 38, the menu would have appeared immediately.*

### Using Channel Scan to Tune In to a Channel

Press the numeric key on your TV handset which you wish to assign to satellite programmes (choose one that is free of any other broadcasting).

to use the ◀ or ▶ key if you did not stop the scan at exactly the correct channel to give the best picture.

### Fine Tuning a Channel

At the UHF Tuning Menu, press the F key followed by the UHF (5) key.

A second option will appear on the menu, with its value flashing.

Press the ◀ or ▶ key to go through the values one at a time until the best quality background can be seen on the screen.

Fine tune can have any value between -15 and 15. As you fine tune, the value will also be displayed on the receiver's front panel.

**UHF TUNING MENU**

CHANNEL 38

FINE TUNE -5

**Press F then LEFT/RIGHT to start scan.**

### Storing the UHF Tuning Information

When you have set the required values for all of the options in the UHF Tuning Menu, press the STORE key.

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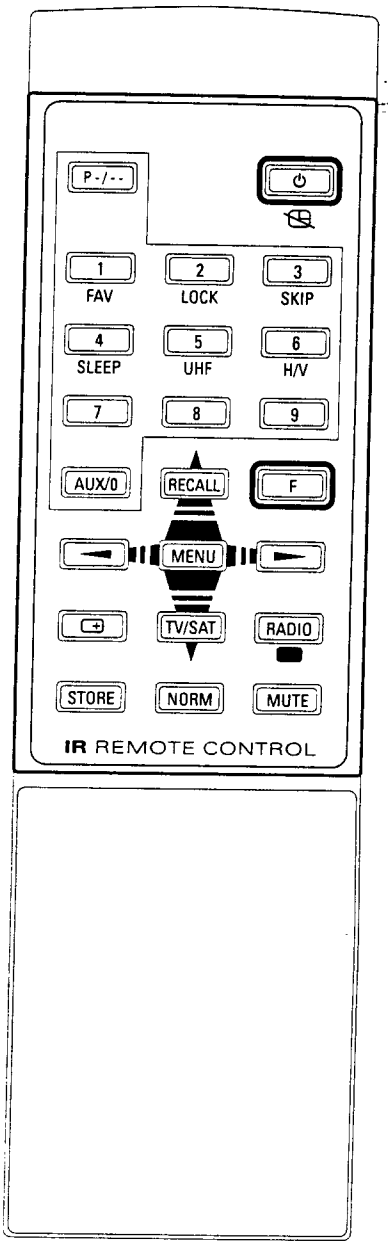
## HANDSET OVERVIEW

The handset has a protective film on its top surface, around the keys. You can peel this off, if you wish.

The handset works by sending an infra-red beam to your receiver, therefore be sure to point it towards the infra-red receiver window on the front of the receiver. Do not place any objects which may block the beam between the window and the handset.




### Selecting Programmes

You can browse through the programmes one at a time by pressing the ◄ or ► key. The ► key increments the programme number by one; the ◄ key decrements it by one.

When your receiver is new, it is in P- mode, which means you do not need to use the P-/-- key to select programmes 1 to 9. Select the programmes as follows:

| Prog. No. | Operation |
|---|---|
| 1 to 9 | Press the relevant numeric key. |
| 10 to 99 | Press the P-/-- key then press the two relevant numeric keys. |
| over 100 | Press the P-/-- key twice then press the two relevant numeric keys to complete the number. |

When you press the P-/-- key you temporarily put the receiver into a different P mode which is shown on the screen as follows: P- or P-- or P1--. The dashes indicate how many numeric keys you need to press to display the required programme.

If you watch programmes mainly in the range 10 to 99, or mainly in the range over 100 you can go permanently into P-- or P1-- mode. This will save you having to press the P-/-- key to select these programmes. To change permanently to a different P mode, go temporarily into the required mode (by pressing the P-/-- key the required number of times) and then press the STORE key.

*NOTE: If you are in P-- mode you can select programmes in the range 1 to 9 by putting a zero before the number. The 0 key is labelled AUX/0.*

*NOTE: In the menu options, irrespective of P mode, you can change programme numbers 1 to 9 using just the numeric key.*

### Recalling the Previous Programme

Press the RECALL key to restore the programme you were viewing before you selected your current programme. This key can therefore be used as a toggle to switch between two programmes.

### Keys Used in Menus

| | |
|---|---|
| **MENU** key: | used to enter the Main Menu i.e. display it on your TV screen; used to move back to the previous menu in the menu structure |
| **0 - 9** keys: | used to move down to the next menu in the menu structure; if in one of the lowest menus, used to select an option in the menu; sometimes used to enter numerical values in the menu |
| ▲ key: | used to move up through the options within a menu; *NOTE: The ▲ key is above the MENU key; it has the ▲ label above the key and the word RECALL on the key* |
| ▼ key: | used to move down through the options within a menu; *NOTE: The ▼ key is below the MENU key; it has the ▼ label below the key and the word TV/SAT on the key* |
| ◄ and ► keys: | used to select the values of each option in the menus; |
| **F** key: | used to start certain actions in the menus |
| **NORM** key: | used to leave a menu without storing any of the information you may have just altered in that menu; the receiver returns to normal viewing mode |
| **STORE** key: | used to store information you have just altered in a menu, so that this information becomes valid, and will be visible when that menu is re-entered |

*NOTE: The ▲, ▼, ◄ and ► keys all cause a "wrap" (e.g. pressing the ▼ key at the last option in a menu will select the first option, or if the possible values are 1, 2 and 3, and you keep pressing the ► key, 1, 2, 3, 1, 2....etc will be displayed).*

## Function Mode

**F** key: used to put the receiver into function mode; it has a blue border to show that those keys with blue coloured labels below them are valid in function mode

The following are the keys which are valid in function mode. When they are mentioned in the text, their blue label will be given first, with their normal key label given in brackets afterwards.

**FAV** key: used to show your list of favourite 10 programmes and to enter favourite programme mode

*NOTE: This facility is not available for the single input receiver.*

**LOCK** key: used as a quick method of locking programmes, as an alternative to using the Parental Lock Menu

**SKIP** key: used to skip a programme so that it is bypassed when you browse through the programmes using the ◀ and ▶ keys

**SLEEP** key: used to put the Sleep Timer Menu on screen; this is a useful way of switching off the receiver at a later time or as an instant record feature in conjunction with your VCR

**UHF** key: used to put the receiver into UHF tuning mode

**H/V** key: used as a rapid method of changing the polarity of a programme, as an alternative to using the Tuning Menu

■ key: used to put the receiver into radio mode and to give a blank screen

*NOTE: This facility is not available for the single input receiver*

key: used to cancel an event that has been set up in the Timer Menu, while the event is occurring

**STORE** key: used to store functions set up in function mode; also used to disable/enable the plain, coloured screen which results when a signal is too weak to give a picture

## Other Key Operations

**AUX** key: used to select the auxiliary programme, via which programmes from an external receiver can be viewed

**RECALL** key: used to recall the last programme you were viewing

key: this is the status key, used to display, at the top of the screen, the status of the programme you are currently viewing

**TV/SAT** key: used to switch between terrestrial and satellite reception when the TV and receiver are connected using a SCART lead

**RADIO** key: used to select satellite radio channels; when pressed, the current audio mode is displayed; this mode can then be changed to any of the preset options, some of which may provide TV commentary in different languages, rather than radio channels.

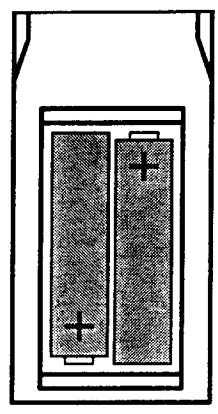
**MUTE** key: used to mute the sound (the word MUTE is displayed on screen); if the sound is muted, used to restore the sound to its previous level

## Changing the Batteries

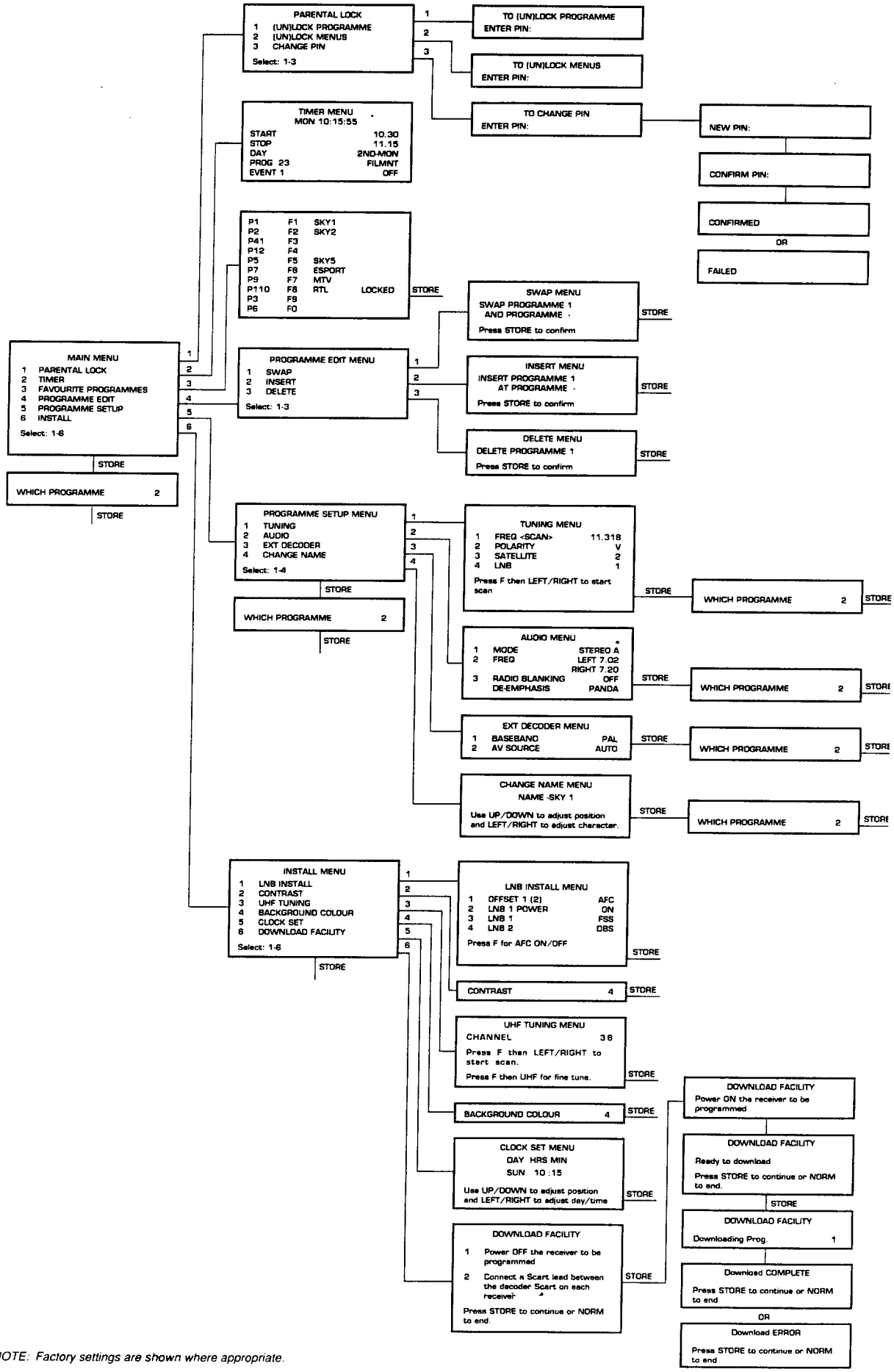
The handset runs from two AA batteries located under a cover on the underside of the handset. These batteries will need replacing from time to time. You should do this as soon as the handset fails to operate from the normal viewing distance.

Pressing down slightly on the ridged part of the battery cover, slide the cover in the direction marked ▼ OPEN. Remove the old batteries and put in the new ones in the orientation shown in the figure. Slide the cover back into position.

*NOTE: Never leave flat batteries in the handset, as they may leak and corrode the metal contacts.*



# MENU STRUCTURE




*NOTE: Factory settings are shown where appropriate.*

# SUMMARY OF MENU VALUES

## Sleep Timer Menu

When the menu is entered, the time displayed is the receiver's current time plus 30 minutes. The sleep timer menu will be effective even if the receiver's clock has not been set to the correct time. Press tne F key to add multiples of 30 minutes to the stop time or use the ◀ or ▶ key to customise the stop time.

SLEEP TIMER MENU
SUN 00:25:24
STOP: 00:55
Press F to add 30 mins.
Press STORE to confirm.

## Timer Menu

**Start and Stop:** any value (using numeric or ◀ and ▶ keys); 24-hr clock

**Day:** TODAY or day of the week and week (using ◀ and ▶ keys); week can have values 1ST, 2ND (also 3RD or 4TH for dual input receiver).

**Prog:** programme number up to 199 for dual input receiver or up to 120 for single input receiver; single input receiver will not show a programme name (they cannot be named).

**Event:** up to 8 for dual input receiver or up to 4 for single input receiver; can be ON or OFF (using ◀ or ▶ key).

TIMER MENU
MON 10:15:55

| | |
|---|---|
| START | 10.30 |
| STOP | 11.15 |
| DAY | 2ND-MON |
| PROG 23 | FILMNT |
| EVENT 1 | OFF |

## Tuning Menu

**Freq:** any value in the appropriate band (using numeric or ◀ and ▶ keys); the band is chosen at the LNB option of the LNB Install Menu.

**Polarity:** H or V (using ◀ or ▶ key or F followed by H/V key).

**Satellite:** any value in range 1 to 128 (using ◀ or ▶ key).

**LNB:** only present for dual input receiver and has value 1 or 2 (using ◀ or ▶ key).

TUNING MENU

| | | |
|---|---|---|
| 1 | FREQ <SCAN> | 11.318 |
| 2 | POLARITY | V |
| 3 | SATELLITE | 2 |
| 4 | LNB | 1 |

Press F then LEFT/RIGHT to start scan

## Audio Menu

**Mode and Freq:** see values listed in the specification at front of manual.

**Customised frequency:** any value between 5 MHz and 9 MHz (using numeric or ◀ and ▶ keys).

**Radio Blanking:** only present for dual input receiver and has value ON or OFF (using ◀ or ▶ key).

**De-emphasis:** can only be changed for mono modes and can have value PANDA or 50 µs.

AUDIO MENU

| | | |
|---|---|---|
| 1 | MODE | STEREO A |
| 2 | FREQ | LEFT 7.02 |
| | | RIGHT 7.20 |
| 3 | RADIO BLANKING | OFF |
| | DE-EMPHASIS | PANDA |

## External Decoder Menu

**Baseband:** value PAL or MAC (using ◀ or ▶ key).

**AV Source:** any of the values AUTO, EXT-V or EXT-AV (using ◀ or ▶ key).

EXT DECODER MENU

| | | |
|---|---|---|
| 1 | BASEBAND | PAL |
| 2 | AV SOURCE | AUTO |

## LNB Install Menu

**Offset:** default value AFC; this can be turned off (using F key) and a value between -15 and 15 can be set if required (using ◀ or ▶ key). For dual input receivers a programme from each LNB is chosen to set OFFSET 1 then OFFSET 2.

**LNB 1 Power:** only present for dual input receivers and can be ON or OFF (using ◀ or ▶ key).

**LNB:** value can be FSS, DBS or T-COM band (using ◀ or ▶ key); for dual input receiver there is also the option to set LNB 2.

LNB INSTALL MENU

| | | |
|---|---|---|
| 1 | OFFSET 1 (2) | AFC |
| 2 | LNB 1 POWER | ON |
| 3 | LNB 1 | FSS |
| 4 | LNB 2 | DBS |

Press F for AFC ON/OFF

## Contrast Menu

**Contrast:** any value between 1 and 8 (using ◀ or ▶ key); default value is 4; can change programme to check contrast setting across several programmes and optimise as required.

| | |
|---|---|
| CONTRAST | 4 |

## Background Colour Menu

**Background Colour:** only present for the dual input receiver and can have any value between 1 and 8 (using ◀ or ▶ key); default value is 4 (blue). For single input receiver plain screen is always blue.

| | |
|---|---|
| BACKGROUND COLOUR | 4 |

## IMPORTANT OPERATIONS

If the TV has been connected via coaxial cable, the UHF Tuning Menu (a sub-menu of the Install Menu) is an important starting point for adjusting the receiver. Consult the Quick Start Instructions.

### LNB Install Menu

Reach this menu via the Main and Install menus. The Install Menu is used to make "global" adjustments for all programmes. Before making any adjustments, allow a few minutes for the LNB to reach its full operating temperature.

OFFSET is the first option on the menu. The LNB offset is adjusted to compensate for variations in LNB output frequency and to give a picture as free from sparklies as possible. The factory default is AFC (automatic frequency control) as the receiver can compensate automatically for variations in the LNB's frequency.

You may occasionally need to set an actual value for OFFSET, if you do not see a good quality picture with AFC. To do this, proceed as follows.

Select a programme which has LNB 1 assigned to it (so that option 1 is OFFSET 1).

At option 1, press the F key to turn AFC off, then press the ◀ or ▶ key to go through the available values one at a time until you get the clearest picture. The offset can have any value between -15 and 15.

If the receiver is a dual input model, select a programme which has LNB 2 assigned to it and repeat the above procedure to get the clearest possible picture for OFFSET 2.

If the menu contains an LNB 1 POWER option, make sure this is turned ON unless LNB 1 is an SMATV communal dish aerial.

At the LNB option (and LNB 2, if present) set the correct frequency band for the programmes you wish to receive from a particular satellite via that LNB. Failure to do this will not prevent reception of these programmes, but their frequencies will be shown as the wrong value in the Tuning Menu.

| | |
|---|---|
| FSS | 10.950 - 12.100 GHz e.g. Astra |
| DBS | 11.700 - 12.850 GHz e.g. TDF |
| T-COM | 12.425 - 13.575 GHz e.g. French TELECOM |

Before leaving the LNB Install Menu, press the STORE key to store the settings.

LNB INSTALL MENU

| | | |
|---|---|---|
| 1 | OFFSET 1 (2) | AFC |
| 2 | LNB 1 POWER | ON |
| 3 | LNB 1 | FSS |
| 4 | LNB 2 | DBS |

Press F for AFC ON/OFF

### Tuning Menu

Reach this menu via the Main and Programme Setup menus. The Programme Setup Menu is used to make adjustments on a per-programme basis.

Use the Tuning Menu to set the frequency and polarity of a programme if you know these, the satellite value and LNB (if this option is present).

Note that some early dish positioners need a software upgrade to be fully compatible with the SATELLITE option. They will however respond if, when the SATELLITE option has been set for each programme, the receiver and positioner are connected together via a SCART lead and then any **one** programme number from each satellite is programmed (at the positioner) against its appropriate position number. (This contrasts with earlier receivers, where each programme number has to be programmed, at the positioner, against the appropriate satellite's position number.)

To find new programmes, turn on the frequency scan by pressing the F key followed by the ◀ or ▶ key while the FREQUENCY option is selected. The frequency value will keep changing and then stop when the next satellite transmission frequency in the band is reached. The background to the menu will be a solid colour until the transmission frequency is reached, then a programme appears as the menu's background. If this is a transmission you want to allocate to a programme number, press the F key to exit the scan. If it is not, press the ◀ or ▶ key to continue the scan.

There is a quick scan mode which is very useful when you first align a dish aerial and the signal is too weak to disable the plain background in normal scan mode.

While in frequency scan mode, press the AUX/0 key to start quick scan mode. The receiver will scan quickly through the whole frequency range and there will always be a picture (although this will sometimes be noisy and distorted) as the menu's background. When the dish has been aligned sufficiently to obtain a stronger signal, press the AUX/0 key again to return to normal scan mode.

When you have set all the tuning information for the programme, press the STORE key. You will be requested, via an on-screen message, to assign this information to a programme number. Key in the required number and press the STORE key again.

TUNING MENU

| | | |
|---|---|---|
| 1 | FREQ <SCAN> | 11.318 |
| 2 | POLARITY | V |
| 3 | SATELLITE | 2 |
| 4 | LNB | 1 |

Press F then LEFT/RIGHT to start scan

## Displaying a Programme Immediately on Power On

Generally, when you switch on the mains power to the receiver, it will be in standby mode. You can, however, program it to display a specified programme immediately. This is not recommended for individual installations, as any interruption of the mains supply will cause the programme to appear on screen when the mains supply is restored. It is, however, useful in SMATV applications, where there is a communal dish aerial.

Press the F key followed by the RECALL key, then key in the programme number using the P-/-- key and numeric key(s). Press the STORE key to store this setting.

## Download Menu

Reach this menu via the Main and Install menus. Use it to download all the information in the receiver's $E^2$PROM to a second receiver of the same type.

Follow the instructions given on-screen. It is very important that you follow the on-screen instructions exactly, otherwise errors may occur.

During the download, messages appear on-screen to tell you the programme information currently being downloaded. The download takes about 15 seconds, then the message Download COMPLETE should appear. When this message has appeared, you can disconnect the second receiver.

If the download fails for any reason, the message Download ERROR will appear.

When the download is complete, press the STORE key to return to the Install Menu or the NORM key to return to normal viewing mode. If, at any stage before the final pressing of the STORE key, you wish to stop the download, press the NORM key.

## Resetting Factory Defaults

To reset the PIN to its default value of 1234, turn off the mains power to the receiver, then press and hold down the ⏻ key while you turn on the power again. You need to hold down the key as long as the characters DP are displayed on the screen. This action will also unlock any locked programmes and unlock the menus, if they were locked.

To reset all of the parameters (including the PIN) to their factory defaults, put the Main Menu on the screen then press the P-/--, STORE, ▶ and ◀ keys quickly, one after the other, in that order. Note that this will result in any user customisation of programmes being lost.

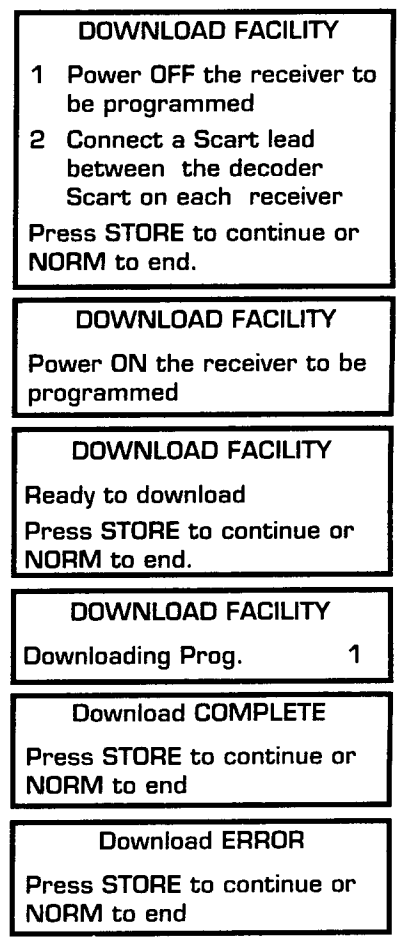
The programme listing will default to that stored in the microprocessor chip U2. This may not be the same as the programme listing which was in the receiver when it left the factory, as this listing is downloaded before shipment.

## Cancelling a Plain Coloured Screen

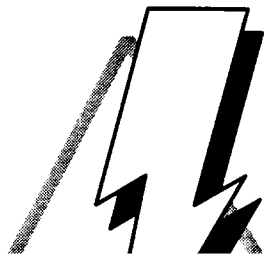
Received signals need to be of a certain strength to give a picture on the screen. If they are not strong enough, there will be a plain, coloured screen. To cancel this plain screen, press the F key followed by the STORE key.

This feature is useful when you are trying to tune in to weak signals (perhaps because the dish aerial is slightly out of alignment). Press F followed by STORE again to redisplay the plain screen.

*NOTE: You can only perform this function outside the menu structure, therefore if there is a menu on-screen (e.g. the Tuning Menu) you will first need to exit the menu, disable the plain screen and then re-enter the menu to continue the tuning process.*


DOWNLOAD FACILITY
1 Power OFF the receiver to be programmed
2 Connect a Scart lead between the decoder Scart on each receiver
Press STORE to continue or NORM to end.
DOWNLOAD FACILITY
Power ON the receiver to be programmed
DOWNLOAD FACILITY
Ready to download
Press STORE to continue or NORM to end.
DOWNLOAD FACILITY
Downloading Prog. 1
Download COMPLETE
Press STORE to continue or NORM to end
Download ERROR
Press STORE to continue or NORM to end

## HANDLING ELECTROSTATIC SENSITIVE (ES) DEVICES



Many semiconductor devices, such as integrated circuits and field effect transistors, can easily be damaged by static electricity. The following precautions should be observed when ES devices are being handled.

- Always use a grounded tip soldering iron and antl-static type solder removal devices.
- Before handling a device, discharge any electrostatic charge on your body by touching a known earth point - preferably use an earthed bench mat or ground

## GAINING ACCESS TO THE UNIT

**REMEMBER - SAFETY FIRST**

**WARNING: always disconnect the unit from the mains supply before dismantling it.**

**WARNING: remove your wrist strap before applying power to the re-assembled equipment to avoid potential shock hazards.**

**WARNING: The incorrect substitution of electrolytic capacitors may result in an explosion hazard.**

**CAUTION: work on an earth mat and wear a wrist strap and earth lead to prevent electrostatic damage to the components. Once the main board is removed from the casing it is fairly flexible, so handle it carefully to avoid damaging the components.**

**CAUTION: You must replace all the PCB fixings, screws etc. when the unit is re-assembled, otherwise there could be hazards due to reduced clearances.**

**CAUTION: Before you apply mains power to the unit, always ensure that the voltage rating stated on the rear panel of the unit matches the mains voltage supply in the country of installation.**

**CAUTION: Do not spray any chemicals on or near the unit.**

**CAUTION: Replacements for faulty components must be of the correct value and rating and must be assembled by a competent engineer, otherwise safety approvals could be invalidated.**

### Removing the Cover

Remove the 5 taptite screws (A). Three are at the rear of the unit (Figure 1) and one is in each side (Figure 2).

Hold both sides of the cover and slide it towards the rear of the unit to remove it.

### Removing the Front Panel

Once the top cover has been removed, remove the front panel by gently prising the two lugs (X) outwards, as shown in Figure 3.

### Removing the Main PCB

Refer to Figure 3.

Remove the phono socket screw (B) and the mains socket screw (D).

Remove ground connection taptite screw (F).

Remove the 3 push rivet fixings (E).

Whilst lifting the front edge of the main PCB, crimp together the stand-off prongs (H) using tweezers to free the PCB.

Gently slide the PCB away from the rear panel to remove it from the casing.

### Re-assembling the Unit

Reverse the above procedures to re-assemble the unit.

*Figure 1*

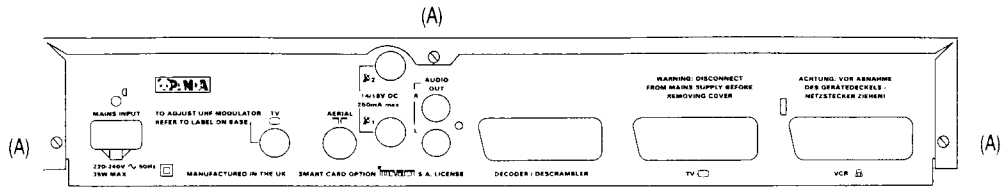



*Figure 2*

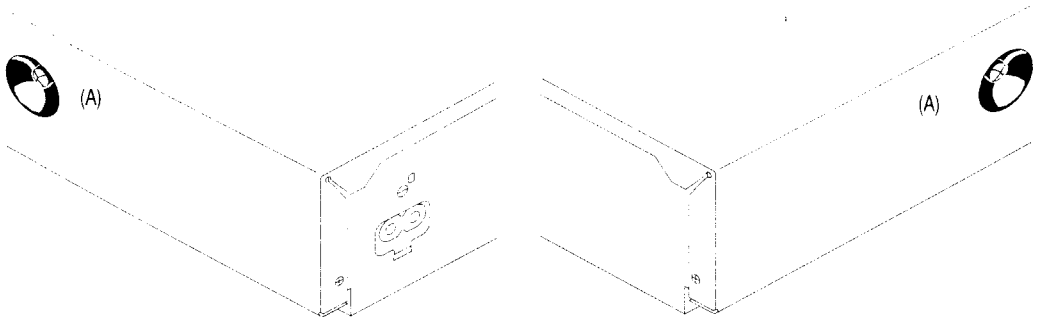
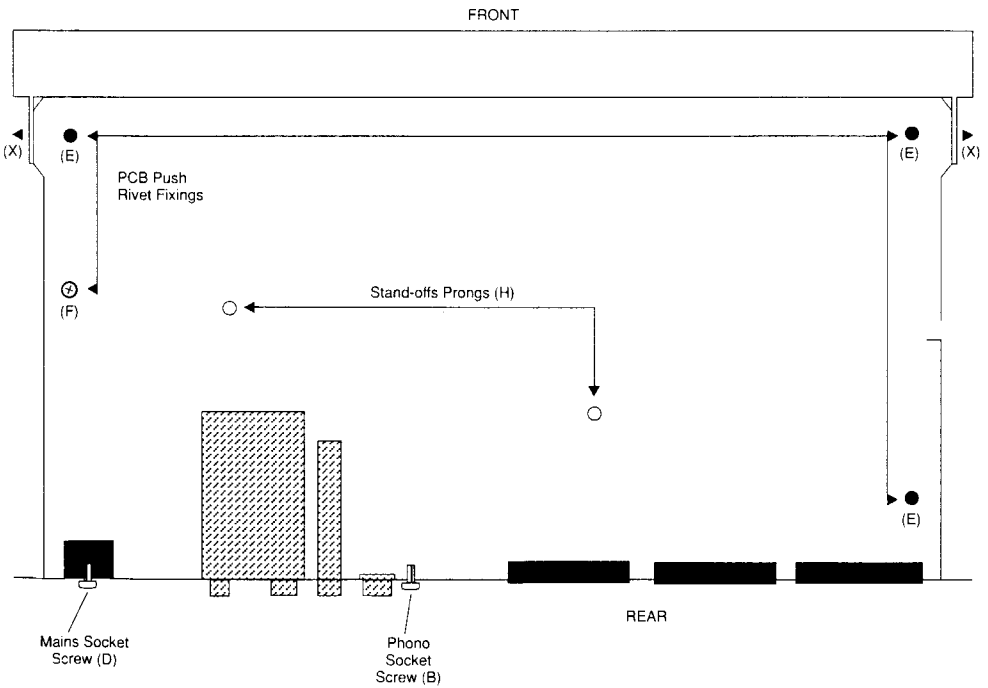
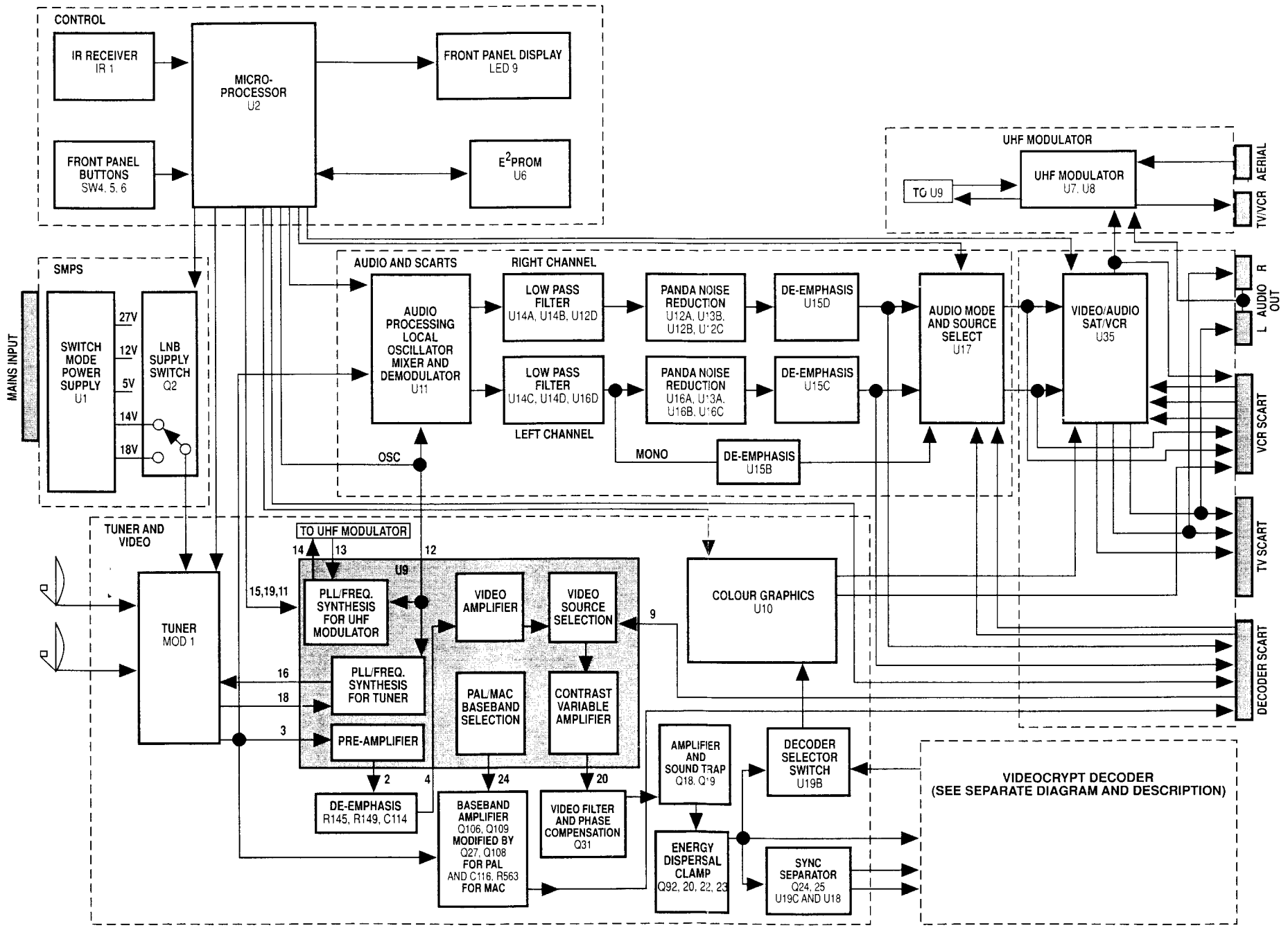



*Figure 3*
*Top View*



## MAIN BLOCK DIAGRAM



# CIRCUIT DESCRIPTION

All the component parts of the receiver are on one PCB.

All of the functional blocks, with the exception of the VideoCrypt decoder, are shown on the main block diagram; the decoder functions are shown in detail on a second block diagram.

## TUNER AND VIDEO PROCESSING

### Tuner

The desired programme is selected via the handset or front panel buttons. Data from the handset is received by the sensor IR1. The TTL level data is fed to the microprocessor U2 for decoding. U2 then interprets this information and supplies tuning data to a frequency synthesiser within U9. This synthesiser generates a tuning voltage which varies the local oscillator in the tuner (MOD 1). This voltage can be observed on pin 15 of MOD1.

The local oscillator, which is 479.5 MHz higher in frequency than the chosen programme, is mixed with the incoming signal. The desired signal is selected by an IF stage centred a 479.5 MHz and having a bandwidth of 27 MHz. The local oscillator output from the tuner is obtained from a prescaler, the output of which is the local oscillator frequency divided by 128. The 479.5 MHz FM signal is then demodulated in MOD1 to give the required composite video baseband signal (CVBS) output.

The frequency synthesis is performed by U9, which receives divider ratio data for the required programme from U2. The synthesiser generates a reference frequency from the 4 MHz clock input on pin 12 of U9. The prescaled input on pin 18 of U9 is divided down according to the divider ratio data and compared with the generated reference, the error signal being used to generate the tuner control voltage, via Q15, on pin 15 of MOD1.

To compensate for LNB frequency conversion offsets, the synthesised frequency can be varied, automatically, by U2. This process, known as automatic frequency control (AFC) keeps the TV signal central in the 479.5 MHz bandpass filter in MOD1.

For a receiver which has a dual LNB input tuner, the Tuning Menu can be used to specify each programme as entering the receiver via LNB 1 or LNB 2. Pin 6 is the select line for LNB 1 and it is enabled by Q17; pin 4 is the select line for LNB 2 and it is enabled by Q16. Pin 5 is the supply line for LNB 1 and pin 3 is the supply line for LNB 2. The line which controls both the supply and select for LNB 1 comes from pin 11 of U5 in the control circuitry. In a similar manner, pin 10 of U5 controls the supply and select for LNB 2. For a receiver which has a single input tuner, the select line on pin 6 of the tuner is not used and the supply is via pin 5. In the dual input receiver the supply to LNB 1 can be switched on or off at the LNB Install Menu. Pin 9 of U5 controls this switching which is carried out by Q61.

The tuner has a 5 V supply and 27 V is available for the tuning voltage.

The baseband signal from pin 13 of the tuner is coupled to the baseband amplifier, video amplifier and audio circuitry via an emitter-follower Q100 and R520.

### Baseband Amplifier

Q106 and Q109 form a two-stage amplifier whose output is buffered to pin 19 of the decoder SCART connector SK5. The buffered output goes through an emitter-follower Q110 and R267 to drive an output impedance of 75 Ω.

MAC and PAL transmissions use different pre-emphasis when transmitted via satellite. The incoming signal format, PAL or MAC, can be selected at the External Decoder Menu (a sub-menu of the Programme Setup Menu). The PAL/MAC baseband selection switches between the different de-emphasis curves. This is implemented within U9 (under control from U2) and output on pin 24 of U9.

If PAL is selected, the response of the amplifier is modified by the PAL de-emphasis circuit R148, R266, C112 and C113. In addition, there is compensation for insertion loss implemented by Q108 switching R596 in parallel with R597, thereby increasing the gain of the first stage of the amplifier.

If MAC is selected, the PAL response of the amplifier is modified by C116 and R563 to give MAC de-emphasis.

### Video Processing within U9

The baseband output from the tuner enters a pre-amplifier in U9 via pin 3. The gain of the pre-amplifier is set by R134 and R135 and the input is centred around VMID which is 2.5 V. The output from the pre-amplifier is inverted and output from pin 2 of U9. This output is de-emphasised by the circuit R145, R149 and C114.

The signal then re-enters U9 at pin 4 and is fed to the video amplifier within U9. The output from this video amplifier is inverted, it passes out of U9 and then straight back in again where it forms one of the two possible video inputs to the video source selection switch within U9. The second possible video input to this switch is from pin 20 of the decoder SCART connector SK5; it enters U9 at pin 8.

The appropriate video signal from this switch then passes out of U9, enters it again and is fed to a non-inverting contrast amplifier within U9 which can be varied under control from U2. The output from this amplifier at pin 20 of U9 is then filtered.

### Video Filter and Phase Compensation

After the video signal has been amplified in U9, it is coupled to a low pass filter comprising L10, L11 and C103 - C106 which has a cut-off point of 5.5 MHz. Q31 provides phase compensation.

### Amplifier and Sound Trap

After being filtered and phase-compensated the video signal passes through an amplifier and sound trap (Q18, Q19 and associated components) to remove any residual audio sub-carriers. It then passes to the energy dispersal clamp.

### Energy Dispersal Clamp

All satellite transmissions are transmitted with energy dispersal to distribute the transmitted energy more evenly across the transmitted bandwidth. Energy dispersal is a triangular 25 Hz waveform added to the signal. If this triangular signal remains added to the video signal, a flickering can be seen on the screen, therefore this triangular modulation must be removed.

To achieve this, the video signal is ac coupled via a buffer (Q20, C132 and C313) and then clamped to a fixed level during the colour burst period by Q92. Colour burst gating pulses are generated from U18 and are then applied to the gate of Q92 which clamps the signal to a fixed voltage defined by D44, Q22, R172 and R171. Note that D44 is a 2.4 V Zener diode which can be found in the VideoCrypt decoder circuit diagram by pin 7 of U20.

### Sync. Separators

The clamped video signal passes to the sync separators, of which there are two on the PCB.

The first comprises Q24, Q25, D38, R179 and R180 and is used to generate a composite sync signal which is then fed to pin 30 of the graphics generator U10. The second comprises U18 and its associated components and is used to generate vertical sync pulses at pin 15 and colour burst gate pulses at pin 12. These pulses are transferred from 12 V to 5 V pulses by D69 and are used for the energy dispersal clamp and VideoCrypt timing.

This second sync separator also gives out a "Station ID" signal from pin 7 of U18 to indicate whether or not a video signal is present. This is used to switch in the plain coloured background to the menus when no video signal is present (and the menu is therefore not superimposed on a programme).

### Colour Graphics Generator

This is U10 and associated components and is used to generate the background colour(s) of the menus and their text characters, under control from the microprocessor U2. For the dual input receiver there is a choice of eight background colours, for the single input receiver only blue is available. There are two graphics modes for the menus: plain background and superimposed on a programme. There are two oscillators associated with U10.

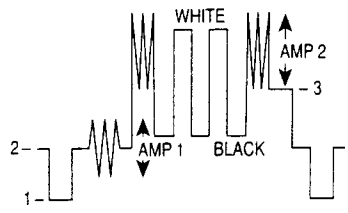
The first oscillator is the crystal X2 which generates a frequency of 17.734 MHz. This is exactly 4 times the frequency of the colour information which is used to generate the background colour(s) and is therefore relevant to plain background mode. If this frequency is not within a few hundred hertz of 17.7344 MHz, there will be no colour to the on-screen graphics display.

The second oscillator is within U10 and it runs at approximately 7 MHz, its frequency being set by external components L12, C119 and C120. This is used, together with

horizontal and vertical sync pulses, to generate the character positions on the screen. The horizontal and vertical sync pulses are generated within U10. For the superimposed mode this generation of the sync pulses is from the composite sync signal which enters U10 at pin 30; for plain background mode this composite sync input is not required for the pulse generation.

For both modes the black and white levels for the characters are generated by R155 and R156 (black) and R153 and R154 (white). They are input on pin 14 for black and pin 15 for white.

In plain background mode, one line of the video signal looks like the adjacent figure. The various levels shown and the amplitude of the bursts are determined by the components associated with specific pins of U10. A table of these pins is given below the figure.




| Parameter | Pin |
|---|---|
| Level 1 | 9 |
| Level 2 | 16 |
| Level 3 | 17 |
| Black level | 14 |
| White level | 15 |
| Amplitude 1 | 20 |
| Amplitude 2 | 19 |

## UHF MODULATOR

The RF output to the TV is generated by a frequency synthesised UHF modulator. This allows the RF output to be precisely tuned to any channel within the UHF bands IV and V (channels 21 - 69).

The circuitry consists of two main component parts, a loop-through amplifier between the aerial input and the output to the TV/VCR, and the UHF modulator itself, which comprises U7, U8 and associated components. The circuitry requires two power supply inputs, one to supply the amplifier (which is always active) and one to supply the UHF modulator itself (which is powered off in standby mode).

The heart of the modulator is the IC U7, a block diagram of which is shown adjacent.

It comprises the following:

- a voltage controlled oscillator that covers the full UHF band;
- an audio oscillator for the sound sub-carrier;
- an amplitude modulator to modulate the UHF carrier with the video;
- a video automatic gain control and clamp to ensure the correct modulation index.

The VCO within U7 is completed by the tuned circuit connected to pins 9,10,12 and 13 of U7.

Tuning is enabled by a DC tuning voltage in the range 0 to 24 V being applied to the varicap diode D21.

Differential outputs from pins 7 and 8 of U7 are fed to pins 3 and 2 respectively prescaler IC U8, which divides them by 64. The output from pin 7 of U8, which should be in the range 7.1875 MHz to 13.4375 MHz, is fed into the UHF modulator's phase locked loop (PLL) circuitry within U9, entering U9 at pin 13.

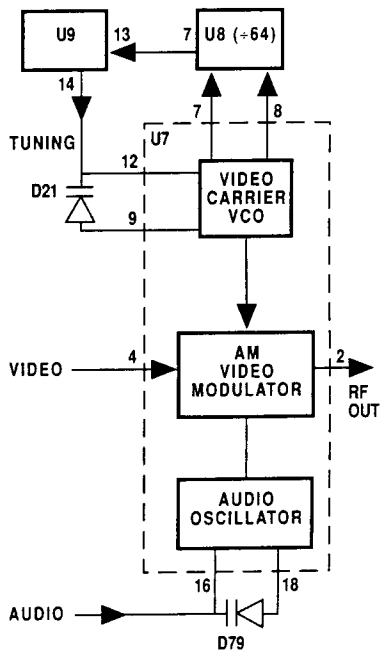
The tuning voltage is derived from pin 14 of U9. It is integrated by Q9, Q97 and associated circuitry and eventually fed to the cathode of D21.

The audio subcarrier oscillator tuned circuit is connected across pins 15 and 16 of U7. This is set at the audio subcarrier frequency (6 MHz for PAL I; 5.5 MHz for PAL G). The audio signal from U15 is fed to the varicap diode D79 which is biased at approximately 8 V. (Note that C144 must be a P2H dielectric to temperature compensate the audio subcarrier oscillator.) This causes the oscillator to be frequency modulated. R103 and C75 provide audio pre-emphasis.

The video signal is fed into pin 4 of U7 via a video filter C67, L30 and C66. This is used to amplitude modulate the VCO output. The modulation index is set to be 80% by resistor R98 on pin 3 of U7.

The output from pin 2 of U7 is fed via a high pass filter (C258, L8 and C244) and a resistive pad (R405. R404 and R472) into a balun L4 which mixes the signal with the terrestrial video signals.

The loop-through amplifier comprises Q10 and Q11. Inputs from the terrestrial antenna pass through a resistive pad (R564, R565 and R566) and a 27 MHz high pass filter C54 and L5. Lightning protection is provided by D22. There is also further high pass filtering by C63, L6 and C41. RF and DC feedback are provided by R82. The output of gain stage Q10 is then fed through another resistive pad (R92, R93 and R94) to give good reverse isolation. RF and DC feedback for Q11 are provided by R86. The output from Q11 feeds the balun L4.



## CONTROL CIRCUITRY

The main component in the control circuitry is U2 which is based on the Z8 microprocessor. In some receivers U2 is a custom-masked single component, but in some early models could be a small µP sub-assembly board containing a standard microprocessor and a separate ROM. This µP board contains four capacitors (C3, C4, C5 and C6), three ICs (U1, U3 and U4) and 4 MHz crystal X1. A parts list for this board is given at the end of this manual. Note that the C3, C4, C5, C6, U1, U3 and U4 in this list are quite different from the components with those names which are on the main PCB.

U2 performs the following functions:

- It detects and decodes the codes received via the IR beam from the handset and from the front panel buttons.
- It generates the control signals for the on-screen graphics.
- It controls the frequency synthesis loops for the tuner and for the UHF modulator.
- It controls the routing of the video and audio signals.
- It controls other switching functions such as the LNB supply switching.
- It activates the front panel 3-character display.

U6 is an $E^2$PROM which is used to store information which is set at the on-screen menus.

U3 and U4 are buffers which limit the current at the ports of U2.

U5 is a multiplexer which determines which of the 3 characters of the front panel display is illuminating at a particular time (although the switching is so quick that they appear to be illuminating simultaneously). U4 determines which of the segments in the 7 segments of each character illuminate, and therefore works in conjunction with U5. These functions are controlled by U2 which runs with a 4 MHz clock generated by crystal X1.

## AUDIO PROCESSING

### Local Oscillator, Mixer and Demodulator

All of these 3 functions are carried out by the audio processing IC U11. The baseband video signal enters pin 24 of U11 via C156. The desired audio sub-carriers are selected by being mixed with a frequency synthesised oscillator to frequencies 10.52 MHz and 10.7 MHz. The oscillator's mixer frequency is controlled by L14, C146 and D39 and the control voltage generated from pins 2 and 3 of U11. The control voltage depends on the sub-carrier selected at the Audio Menu and is therefore controlled from the microprocessor U2.

There are two IF outputs from U11 on pins 21 and 22. Pin 22 is used to drive two filters X3 and X5 which are 10.52 MHz and 10.7 MHz respectively. These frequencies are fed into pins 17 and 15 of U11 respectively, and are demodulated within U11. The FM discriminator slopes are factory tuned by L15 and L16 to set the dc bias of approximately 2.5 V at the audio outputs (which are pin 8 for L27, pin 11 for L15 and pin 14 for L16). The audio outputs from U11 are pin 11 for the right channel and pin 14 for the left channel.

### Low Pass Filter

*NOTE: The left channel is described below. The right channel is the same, except that U14A, U14B and U12D need to be substituted for U14C, U14D, and U16D.*

The demodulated signal from U11 is amplified by U14C, which is configured as a non-inverting amplifier with a gain of 7. It is then passed to two low pass filters (U14D and U16D) connected in series. The filters have their 3 dB points set at 50 kHz and 8 kHz respectively. The combined response of the filters gives a cut-off frequency of 15 kHz with an attenuation slope of approximately 24 dB per octave. The signal then passes on to be de-emphasised.

### 50 µs De-emphasis

All stereo channels are fed via the PANDA noise reduction circuitry to the de-emphasis circuitry, but the mono channels can have 50 µs de-emphasis (although only mode Mono 1 is preset to 50 µs).

This mono audio signal is de-emphasised by U15B and then passed directly to U17, the audio mode and source selection switch.

### PANDA Noise Reduction System and De-emphasis

*NOTE: The left channel is described below. The right channel is the same, except that U12A, U13B, U12B, U12C and U15D need to be substituted for U16A, U13A, U16B, U16C and U15C.*

The PANDA noise reduction system is used by Astra for its narrowband FM sub-carriers to give superior dynamic range and signal to noise performance. At the time of transmission, the signal is compressed according to its level and frequency, therefore, for an FM system, a smaller bandwidth is required. This introduces less noise therefore more sub-carriers can fit into a given channel.

At the receiving end, the signal must be correspondingly expanded to reproduce the original signal. The expansion is achieved using a dual compander IC NE572 (U13A). The input to U13A comes via U16A, which is used as a level converter and has its input biased at mid-rail to allow full swing on the output.

The expander consists of a variable gain cell ($\Delta$ gain), and rectifier. The input signal is fed to the variable gain cell and rectifier. The output of the rectifier controls the gain so that the output is proportional to the average value of the input.

U16B converts the current from the gain cell within U13A to a voltage, which is then passed through a low pass filter U16C to remove the high frequency content of the signal.

Finally the signal is de-emphasised by U15C and the output from this IC is fed to pin 3 of the decoder SCART connector SK5 and to the audio mode and source selection switch. U17.

### Audio Mode and Source Selection

The audio mode and the audio source are selected by analogue switches within U17, under control from the microprocessor U2. The preset audio modes are listed in the specification at the front of this manual. It is also possible to customise audio modes in the range 5 to 9 MHz.

## VIDEO AND AUDIO SIGNAL ROUTING

The TV/SAT control line is connected to pin 8 of the TV SCART connector SK7. The majority of TVs which have a SCART input respond to the state of this line in the following way. If the line is high (5 - 12 V approx.) the TV takes its input from the TV SCART socket, otherwise it takes its input from the TV's tuner. The state of the control line is set by the TV/SAT and ⏻ keys on the handset. In addition, if a VCR is connected to the VCR SCART connector SK6, it can also control the line. The selected TV signal source resulting from the various combinations of the three inputs is shown in the table below.

| Receiver status | TV/SAT selection | VCR SCART | Picture displayed is from |
|---|---|---|---|
| ON | SAT | HI | SAT |
| ON | SAT | LO | SAT |
| ON | TV | HI | VCR |
| ON | TV | LO | TV TUNER |
| STANDBY | TV (automatic) | HI | VCR |
| STANDBY | TV (automatic) | LO | TV TUNER |

## SWITCH MODE POWER SUPPLY

### Mains Input and Rectification

Diodes D1, D2, D3 and D4 rectify the ac mains voltage and, together with smoothing capacitor C2, provide the dc input HT for the SMPS. C1 and T1 form a mains filter to minimise the feedback of RFI into the mains supply. Asymmetrical mains pollution is reduced by the insertion of R19 and C9 between the primary ground and the secondary chassis ground. These components are required to satisfy the mains isolation requirements. They are also safety-critical components of the correct type.

### SMPS Controller U1

The start-up supply for U1 is obtained via R2 which charges C6 to approximately 6 V before U1 will power up. C6 sustains a charge long enough for the switch mode to reach its operating frequency. The supply for U1 is subsequently obtained from a feedback winding of the transformer T2, rectified by D8.

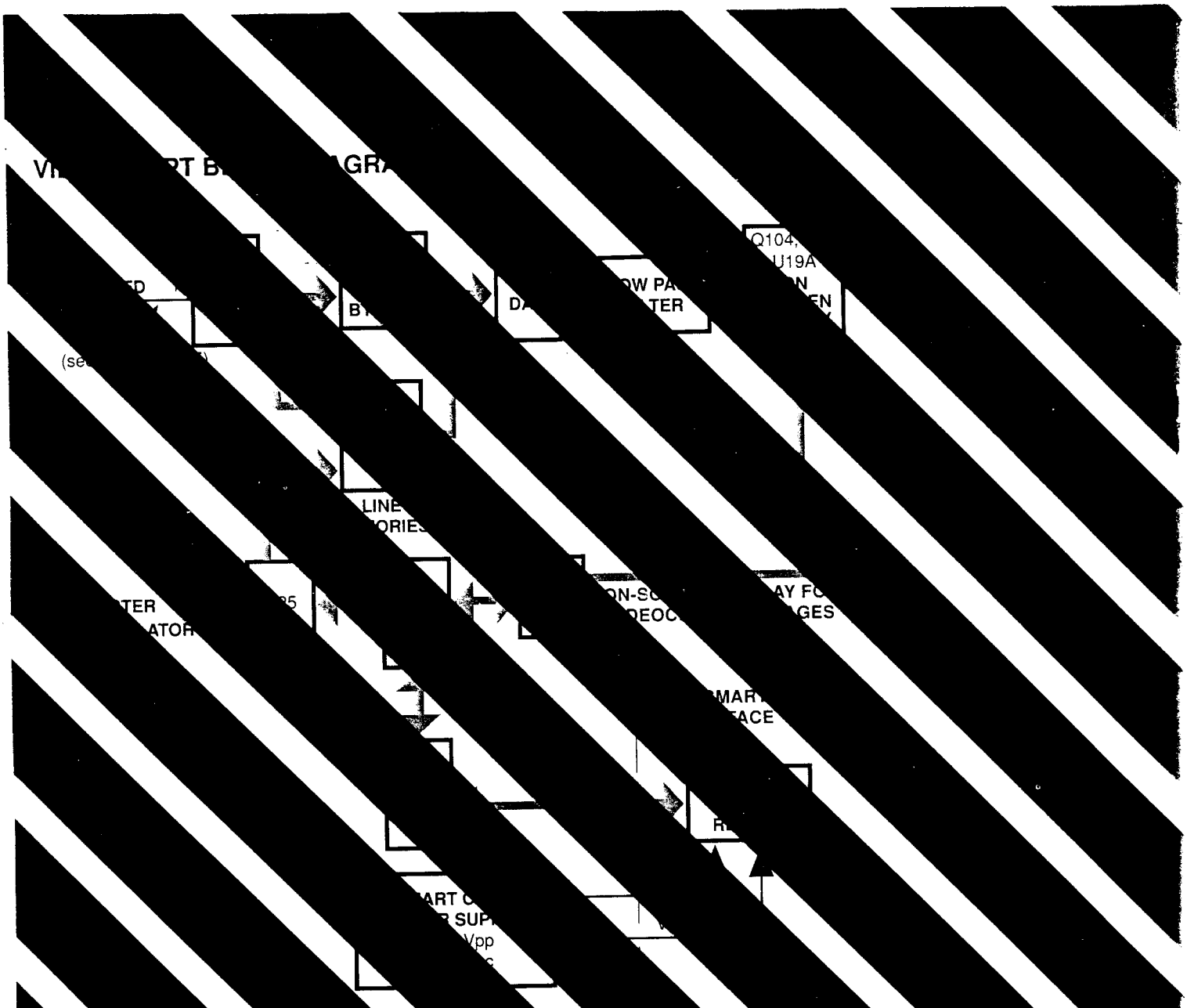
The frequency of the switch mode is set by R13 and C4 and should be 25 to 30 kHz.

Regulation is via the feedback winding which is rectified by D9 and set by R10, R11 and R12 to give a voltage of 2.4 V at pin 8 of U1 when the supplies are at their specified voltages (5 V, 12 V etc.).

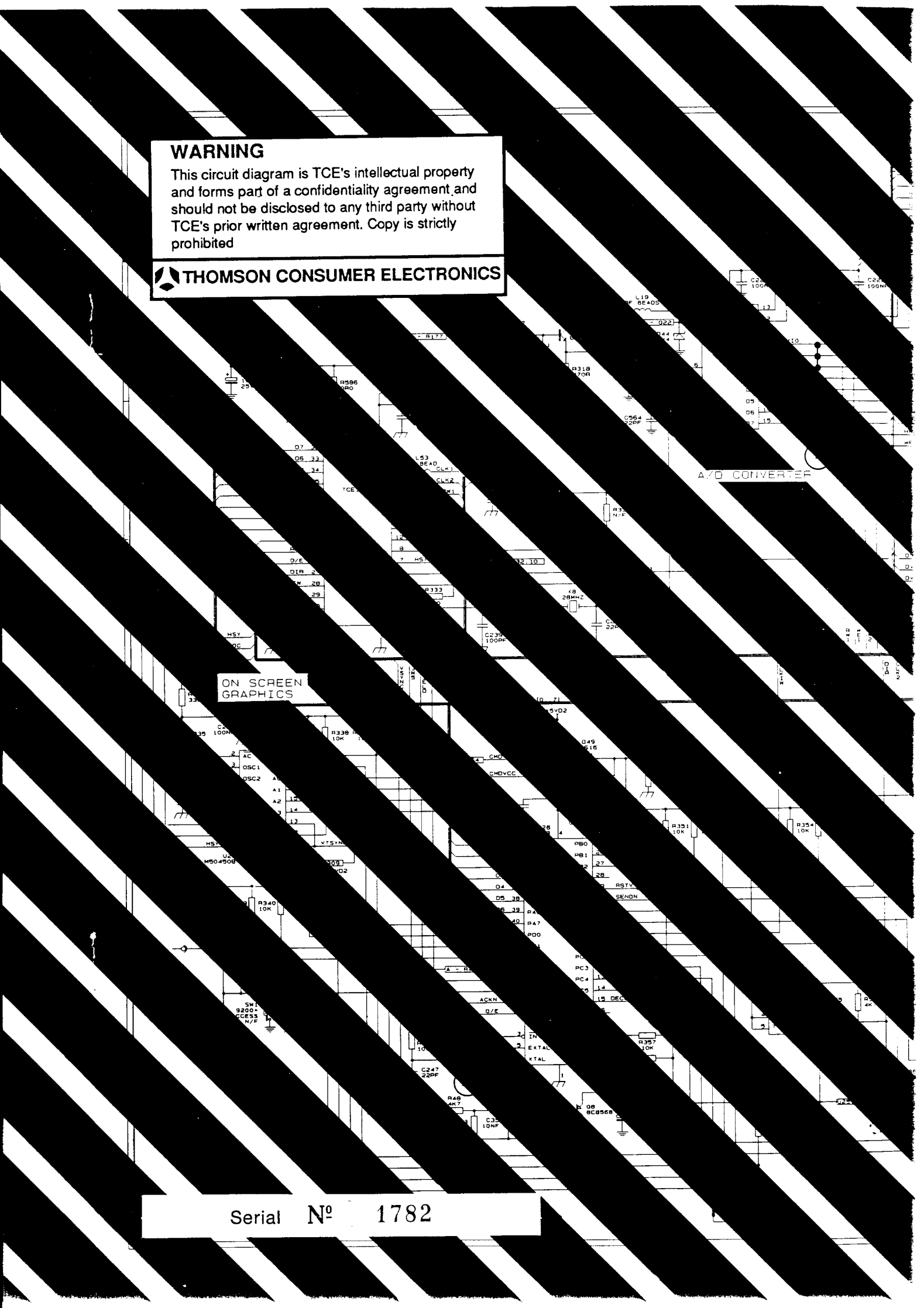
The switching transistor for the switch mode, Q1, is driven directly from U1. A negative supply is generated across D11 which is used to switch Q1 off. Excess energy from the switching of Q1 is dissipated in a snubber network R4, R5, D5, D6 and C3. Overcurrent protection is implemented by R8 and R14.

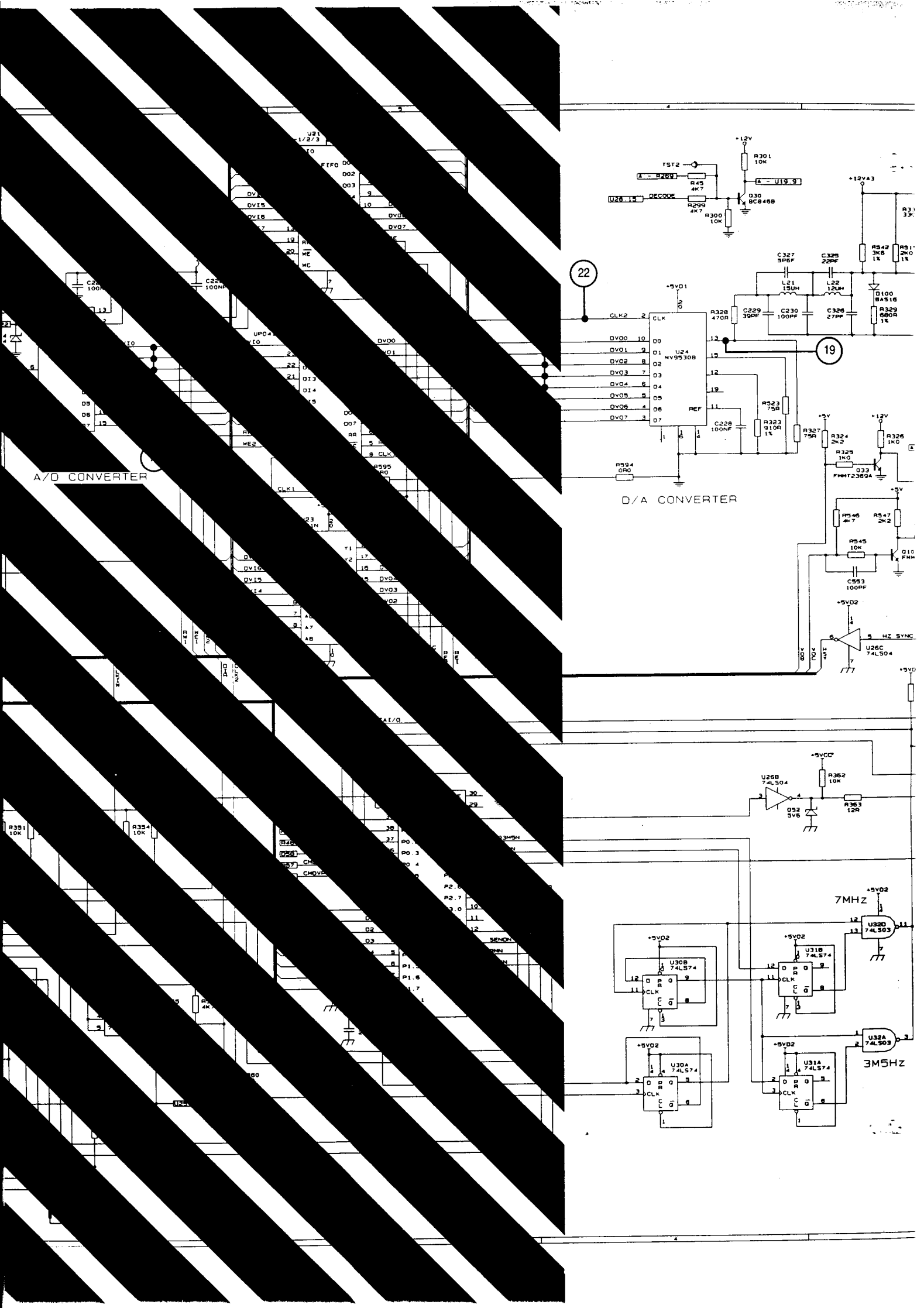
### Circuitry on Secondary Side of T2

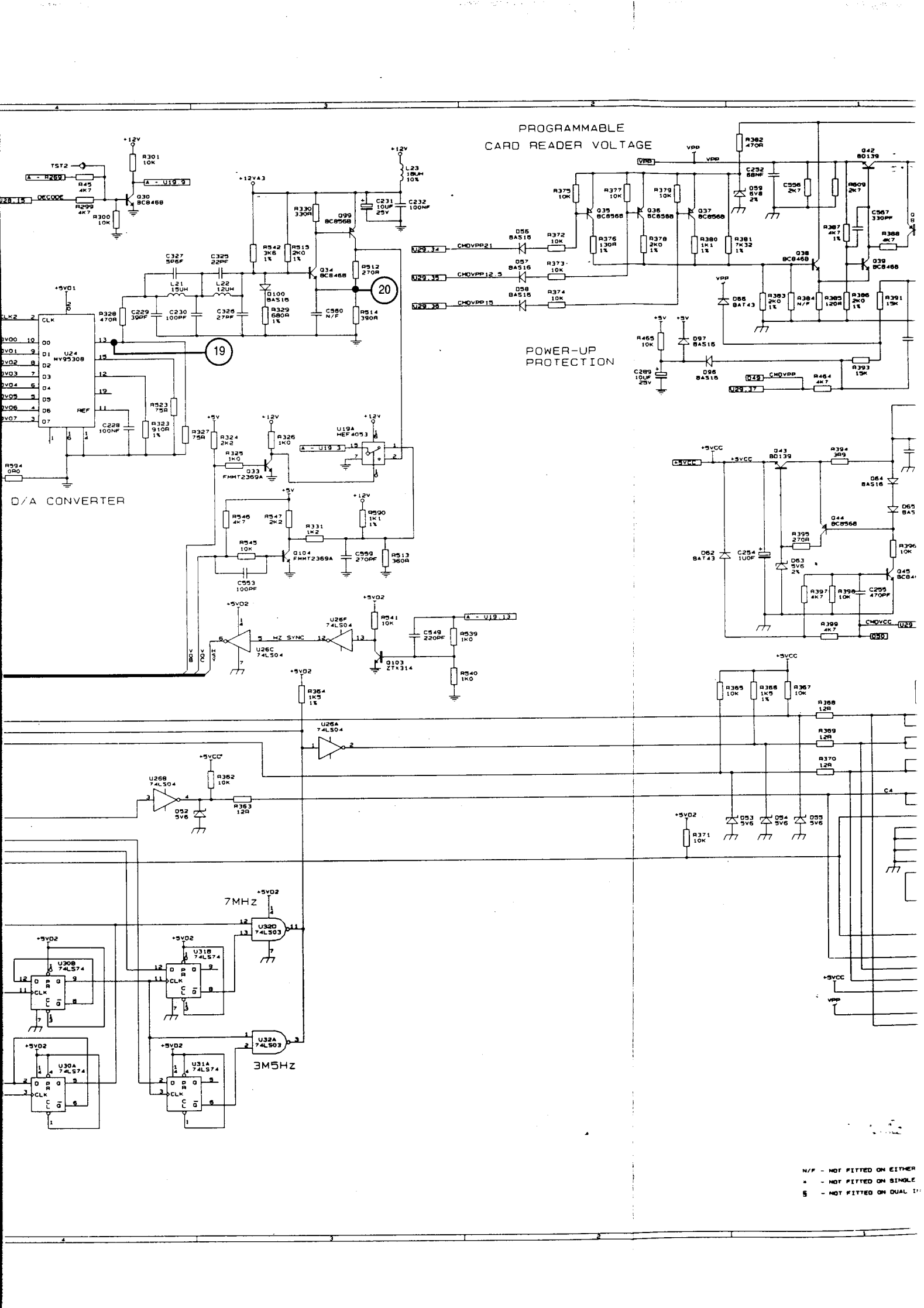
The secondary windings of the transformer T2 provide 5 V, 14 V, 18 V and 27 V supplies which are rectified, smoothed and filtered. The 12 V supply is obtained from the 14 V supply using REG1. The LNB supply is switched between 14 V and 18 V by Q2. The 5 V supply to the modulator is switched using Q3.

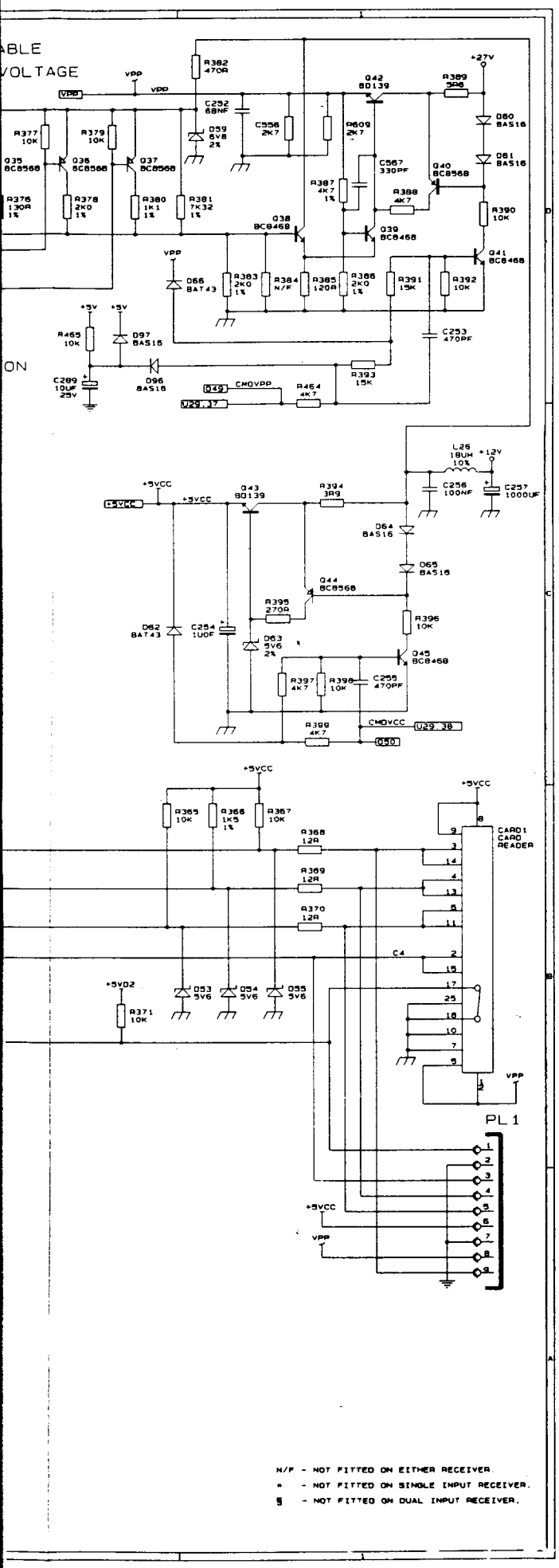


## VIDEO CIRCUIT DESCRIPTION


WARNING
This circuit diagram is TCE's intellectual property and forms part of a confidentiality agreement and should not be disclosed to any third party without TCE's prior written agreement. Copy is strictly prohibited
THOMSON CONSUMER ELECTRONICS
A/D CONVERTER
ON SCREEN GRAPHICS
Serial Nº 1782


A/D CONVERTER
D/A CONVERTER
7MHz
3M5Hz
22
19
U24
MV9530B
74LS74
74LS04
74LS03


PROGRAMMABLE
CARD READER VOLTAGE
POWER-UP
PROTECTION
D/A CONVERTER
7MHz
3M5Hz
DECODE
HZ SYNC
CMOVPP21
CMOVPP12.5
CMOVPP15
CMOVCC
N/F - NOT FITTED ON EITHER
* - NOT FITTED ON SINGLE
§ - NOT FITTED ON DUAL




# GRID REFERENCES - CIRCUIT DIAGRAM C

## CAPACITORS

| | |
|---|---|
| C35 | A7 |
| C125 | D8 |
| C219 | D7 |
| C220 | C6 |
| C221 | D6 |
| C222 | D6 |
| C225 | C5 |
| C227 | D6 |
| C228 | C4 |
| C229 | D4 |
| C230 | D3 |
| C231 | D3 |
| C232 | D3 |
| C233 | D8 |
| C235 | C7 |
| C236 | C8 |
| C237** | C7 |
| C238 | C8 |
| C239 | C7 |
| C240 | C7 |
| C241 | C7 |
| C242 | C7 |
| C243 | B8 |
| C245 | B8 |
| C246 | A8 |
| C247 | A7 |
| C248 | B7 |
| C249 | A7 |
| C250** | A6 |
| C251 | A5 |
| C252 | D1 |
| C253 | D1 |
| C254 | C1 |
| C255 | C1 |
| C256 | C1 |
| C257 | C1 |
| C289 | D2 |
| C318 | B5 |
| C325 | D3 |
| C326 | D3 |
| C327 | D4 |
| C340 | C7 |
| C341** | C7 |
| C549 | C3 |
| C553 | C3 |
| C559 | C3 |
| C560** | D3 |
| C564 | C7 |
| C567 | D1 |

## DIODES

| | |
|---|---|
| D43 | D6 |
| D44 | D6 |
| D48** | C7 |
| D49 | B7 |
| D50 | B7 |
| D51 | A7 |
| D52 | B3 |
| D53 | B1 |
| D54 | B1 |
| D55 | B1 |
| D56 | D2 |
| D57 | D2 |
| D58 | D2 |
| D59 | D1 |
| D60 | D1 |
| D61 | D1 |
| D62 | C2 |
| D63 | C1 |
| D64 | C1 |
| D65 | C1 |
| D66 | D3 |
| D76 | D7 |
| D77 | B8 |
| D96 | D2 |
| D97 | D2 |
| D100 | D3 |

## INDUCTORS

| | |
|---|---|
| L19 | D7 |
| L20 | D6 |
| L21 | D4 |
| L22 | D3 |
| L23 | D3 |
| L24 | D8 |
| L25 | C7 |
| L26 | C1 |
| L52 | C7 |
| L53 | C7 |
| L54 | D8 |

## CONNECTORS

| | |
|---|---|
| PL1 | A1 |

## TRANSISTORS

| | |
|---|---|
| Q7 | A7 |
| Q8 | A7 |
| Q30 | D4 |
| Q32 | D7 |
| Q33 | C3 |
| Q34 | D3 |
| Q35 | D2 |
| Q36 | D2 |
| Q37 | D2 |
| Q38 | D1 |
| Q39 | D1 |
| Q40 | D1 |
| Q41 | D1 |
| Q42 | D1 |
| Q43 | C1 |
| Q44 | C1 |
| Q45 | C1 |
| Q99 | D3 |
| Q103 | C3 |
| Q104 | C3 |

## RESISTORS

| | |
|---|---|
| R45 | D4 |
| R48 | A7 |
| R49 | A7 |
| R113 | A7 |
| R296 | A7 |
| R299 | D4 |
| R300 | D4 |
| R301 | D4 |
| R313** | B8 |
| R317 | D7 |
| R318 | D7 |
| R320 | D6 |
| R321 | C6 |
| R323 | C4 |
| R324 | C3 |
| R325 | C3 |
| R326 | C3 |
| R327 | C4 |
| R328 | D4 |
| R329 | D3 |
| R330 | D3 |
| R331 | C3 |
| R332** | C7 |
| R333 | C7 |
| R334 | C7 |
| R335 | B8 |
| R336 | B8 |
| R337 | B8 |
| R338 | B8 |
| R339 | B8 |
| R340 | B8 |
| R341 | B8 |
| R342 | B8 |
| R343 | B8 |
| R345 | B7 |
| R346 | B7 |
| R347 | B7 |
| R348 | B7 |
| R349 | B7 |
| R350 | B6 |
| R351 | B7 |
| R352 | B6 |
| R353 | B6 |
| R354 | B6 |
| R355 | A6 |
| R356 | A7 |
| R357 | A7 |
| R358 | A7 |
| R359 | A6 |
| R360 | A6 |
| R361 | A5 |
| R362 | B3 |
| R363 | B3 |
| R364 | B3 |
| R365 | B2 |
| R366 | B1 |
| R367 | B1 |
| R368 | B1 |
| R369 | B1 |
| R370 | B1 |
| R371 | B2 |
| R372 | D2 |
| R373 | D2 |
| R374 | D2 |
| R375 | D2 |
| R376 | D2 |
| R377 | D2 |
| R378 | D2 |
| R379 | D2 |
| R380 | D2 |
| R381 | D1 |
| R382 | D1 |
| R383 | D1 |
| R384** | D1 |
| R385 | D1 |
| R386 | D1 |
| R387 | D1 |
| R388 | D1 |
| R389 | D1 |
| R390 | D1 |
| R391 | D1 |
| R392 | D1 |
| R393 | D1 |
| R394 | C1 |
| R395 | C1 |
| R396 | C1 |
| R397 | C1 |
| R398 | C1 |
| R399 | C1 |
| R464 | D1 |
| R465 | D2 |
| R512 | D3 |
| R513 | C3 |
| R514 | D3 |
| R515 | D3 |
| R522 | D7 |
| R523 | C4 |
| R539 | C3 |
| R540 | B3 |
| R541 | C3 |
| R542 | D3 |
| R545 | C3 |
| R546 | C3 |
| R547 | C3 |
| R548 | A6 |
| C556° | D1 |
| R557 | B8 |
| R584 | B6 |
| R585 | B7 |
| R586 | D8 |
| R590 | C3 |
| R591 | D6 |
| R594 | C4 |
| R595 | C5 |
| R609 | D1 |

## ICS

| | |
|---|---|
| U19A | C3 |
| U20 | D6 |
| U21 | D5 |
| U22 | D5 |
| U23 | C5 |
| U24 | D4 |
| U25 | C8 |
| U26A | B3 |
| U26B | B4 |
| U26C | C3 |
| U26D | A7 |
| U26E | C7 |
| U26F | C3 |
| U27 | B8 |
| U28 | B7 |
| U29 | B5 |
| U30A | A4 |
| U30B | A4 |
| U31A | A4 |
| U31B | A4 |
| U32A | A3 |
| U32B | A6 |
| U32C | A6 |
| U32D | B3 |

## MISC. COMPONENTS

| | |
|---|---|
| CARD1 | B1 |
| J1 | A8 |
| J2 | A6 |
| J3 | A6 |
| J4 | A6 |
| S17 | D8 |
| S18 | C7 |
| SW1** | A8 |
| SW7 | A8 |
| TST1 | B8 |
| TST2 | D4 |
| X8 | C7 |

** not fitted on either receiver

* not fitted on single input receiver

§ not fitted on dual input receiver

° a resistor occupying a capacitor position

## MAIN BOARD OSCILLOGRAMS

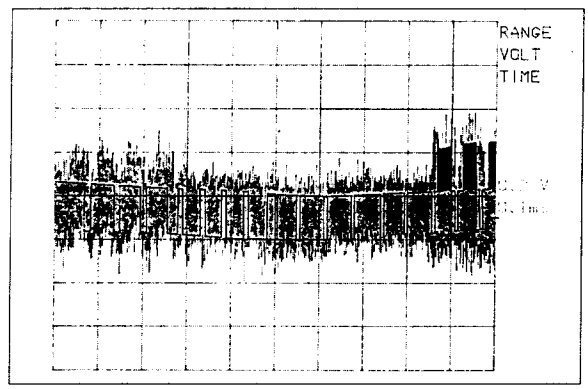
The oscillograms which follow are divided into 5 main sections: Video, Audio, Control, SMPS and VideoCrypt. It is important that, within each of these sections, you check for the presence of the signals in the order they are given (e.g. for the video circuitry you test at points 1 to 8 in that order).

The 26 oscillograms given are numbered sequentially and the appropriate section and circuit diagram letter are also given above each. The oscillogram numbers are marked on the circuit diagrams and the PCB component ident diagrams.

Alongside each oscillogram is a note of where the test is made, a brief description (including any special instructions) and an indication of which components need to be checked if the oscillogram you see on the receiver is not like that shown on the page.

Unless specified otherwise, all the oscillograms have been produced using a DC coupled oscilloscope and have ground at the bottom of the oscillogram.

### 1. VIDEO — CIRCUIT DIAGRAM A




**Test Point:** Q100 emitter

**Description:** AC coupled oscilloscope, 0 V at centre of oscillogram.

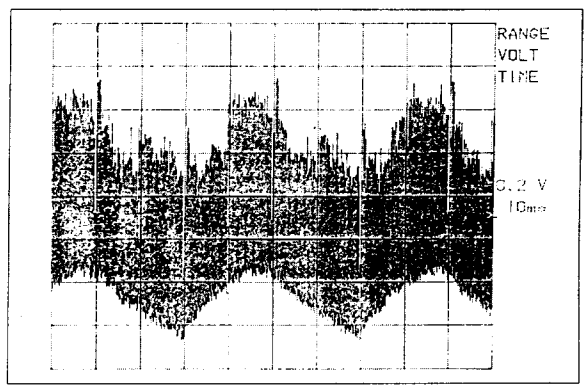
The trace shows tuner output (i.e. totally unfiltered video).

The superimposed line shows, for comparison, the expected trace for filtered video.

**If the trace is not as shown, check:**

- Q100;
- that the tuning voltage changes when different programmes are selected;
- the prescaler output on pin 18 of MOD1;
- the 4 MHz reference at pin 12 of U9;
- the LNB voltage on pin 5 of MOD1.

### 2A. VIDEO — CIRCUIT DIAGRAM A




**Test Point:** Q31 emitter

**Description:** AC coupled oscilloscope, 0 V at centre of oscillogram.

Traces 2A and 2B both show the normal video signal at point 2, only the time axis is different; there may be slight variations in the trace, depending on picture content.

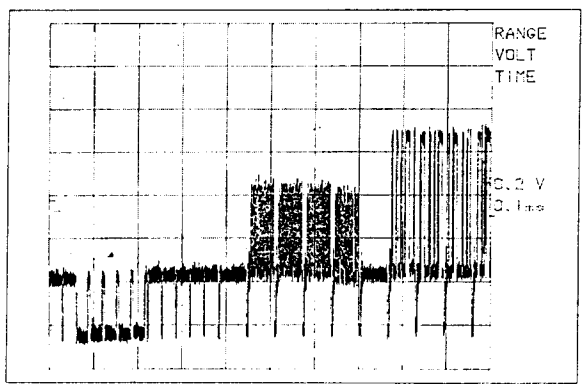
**If the trace is not as shown, check:**

- the route through U9, i.e. check back from pin 20 through to pin 3 of U9 to check that the trace is as shown. (Consult the circuit description for U9.)

Note that pin 3 of U9 is similar, in effect, to point 1 above.

Note that pin 6 of U9 is similar, in effect, to point 1 above, but should give a trace of much larger amplitude (approx. 3 V p-p).

### 2B. VIDEO — CIRCUIT DIAGRAM A




**Test Point:** Q31 emitter (see oscillogram 2A above)

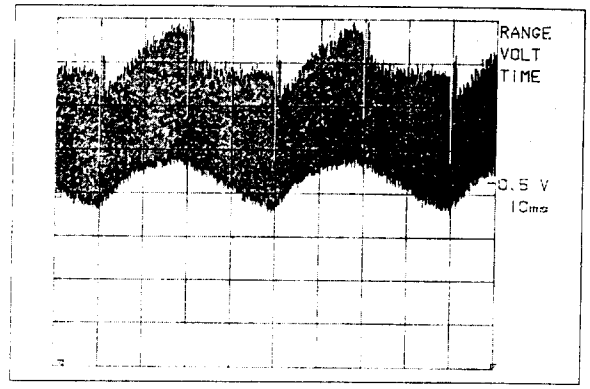
## 3. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Q20 emitter

**Description:** The trace shows unclamped video of the correct gain. This is the video signal at one side of C132, whereas Oscillogram 4, below, shows the signal at its other side.

**If the trace is not as shown, check:**

- the gain stage (Q18, Q19 and Q20).



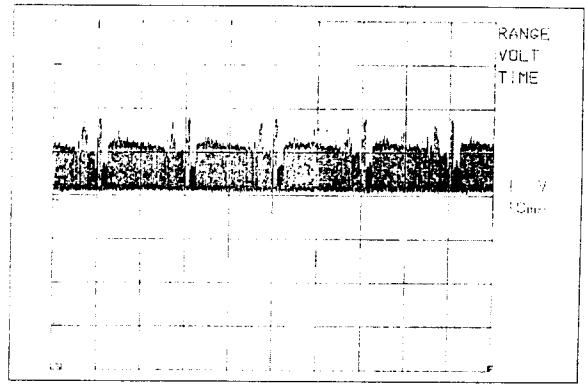

## 4. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Junction of L28 and R175

**Description:** The trace shows clamped video at the correct DC level. This is the video signal at the opposite side of C132, as compared with Oscillogram 3 above.

**If the trace is not as shown, check:**

- the horizontal sync. to the gate of Q92.



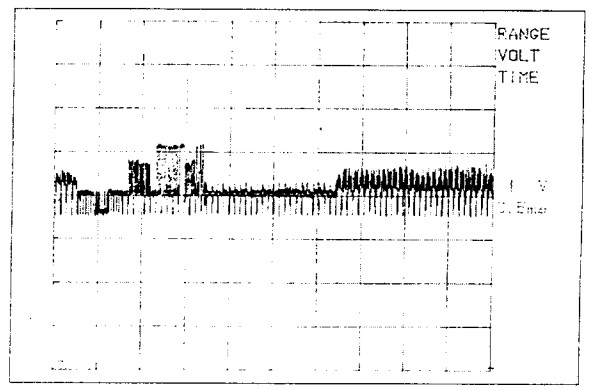

## 5. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Q23 emitter

**Description:** This trace also shows clamped video; its DC level is important - check the DC level.

**If the DC level is not as shown, check:**

- Q23 and its associated circuitry.




## 6A. VIDEO CIRCUIT DIAGRAM A

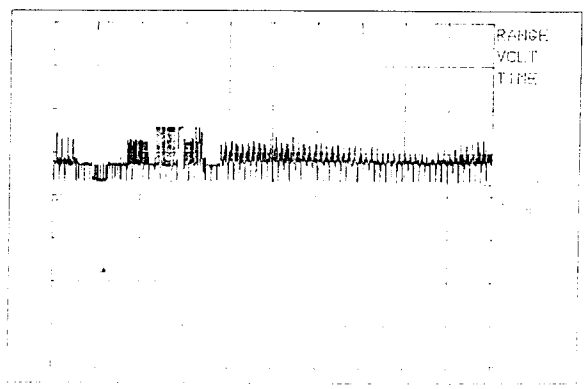
**Test Point:** Pin 12 of U10

**Description:** Trace 6A shows the trace you would expect at point 6 when there is a picture on the screen; trace 6B (next oscillogam) shows what to expect at point 6 if there is a plain coloured background with graphics on the screen.

Check for trace 6A. If this is as expected, remove the input and select a plain coloured screen with graphics (e.g. Main Menu) and look for trace 6B.

**If the traces are not as shown, check:**

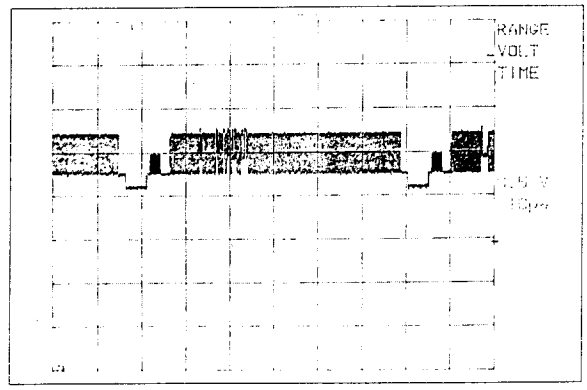
- that the composite sync is being fed into pin 30 of U10 (see oscillogram 7).



## 6B. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Pin 12 of U10 (see oscillogram 6A)

**Description:** Trace 6B shows what to expect at point 6 if there is a plain coloured background with graphics on the screen. The graphics can be seen towards the centre of the trace.



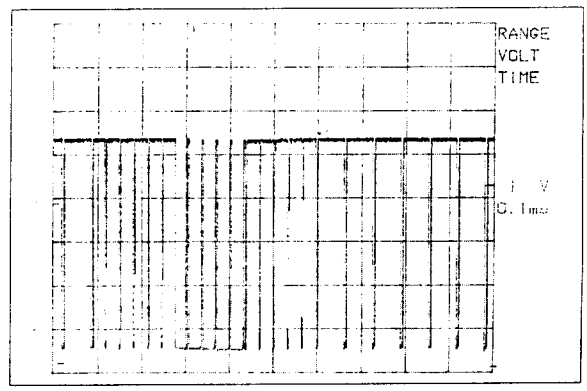

## 7. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Pin 30 of U10

**Description:** The trace shows the composite sync.

**If the trace is not as shown, check:**

- Q24, Q25 and associated circuitry.



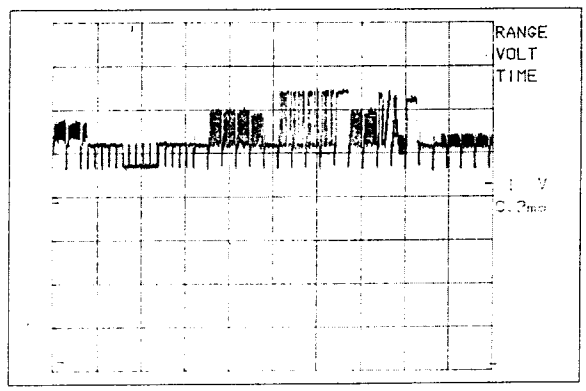

## 8. VIDEO CIRCUIT DIAGRAM A

**Test Point:** Q102 collector (VCR SCART driver)

**Description:** The trace shows 2 V peak-to-peak of clamped composite video.

**If the trace is not as shown or has the wrong amplitude, check:**

- Q102, Q26 and associated circuitry.



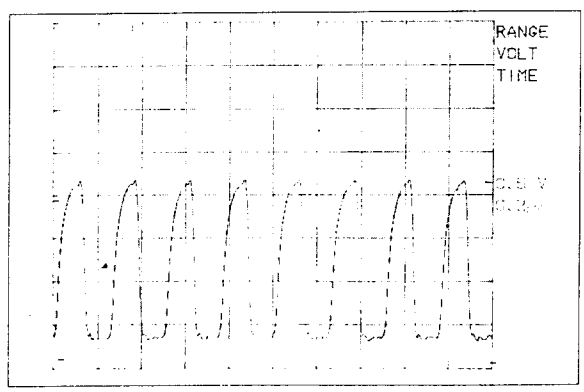

## 9. AUDIO CIRCUIT DIAGRAM B

**Test Point:** Pin 1 of U11

**Description:** The trace shows the amplitude of the 4 MHz reference.

**If the trace is not as shown, check:**

- Q98 and associated circuitry.



## 10. AUDIO CIRCUIT DIAGRAM B

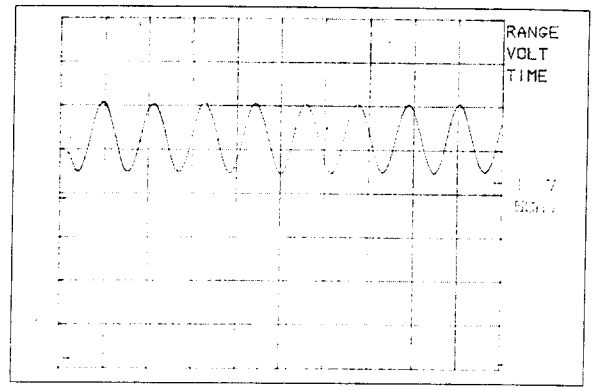
**Test Point:** Pin 4 of U11

**Description:** The trace shows an oscillation whose frequency changes as the audio subcarrier is tuned.

Find the test card, select the Mono 1 audio mode and tune between 5 and 9 MHz. The frequency of the trace should change between 15.7 and 19.7 MHz as you do this. Check also that the voltage on pin 3 of U11 changes as the frequency changes.

**If the trace is not as shown, check:**

- the circuitry associated with pins 2, 3 and 4 of U11.




## 11. AUDIO CIRCUIT DIAGRAM B

**Test Point:** Test point TST3 or TST4

**Description:** The trace should look similar at both points, as TST3 is associated with the left channel and TST4 with the right.

Check that the audio signal is centred at 2.5 V DC.

Follow the audio signal along the following paths:

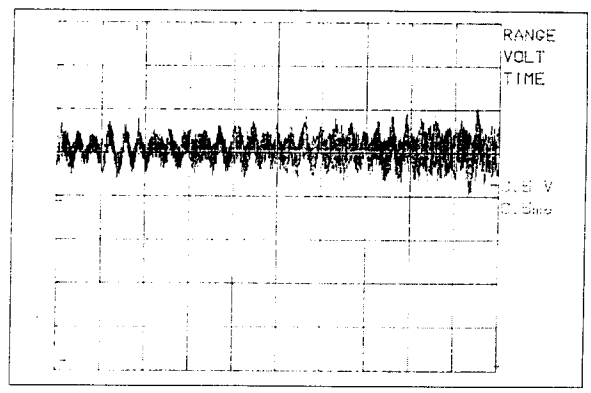
- U14 pin 8, U14 pin 14, U16 pin 8 and U15 pin 8 ( left channel);
- U14 pin 1, U14 pin 7, U12 pin 8 and U15 pin14 (right channel);
- U16 pin 14, U15 pin 7 for mono.

**If the signal is not centred at 2.5 V, check:**

- U11 and associated circuitry.

**If the trace is not as shown at any stage on the path, check:**

- the IC at that point on the path or its associated circuitry.



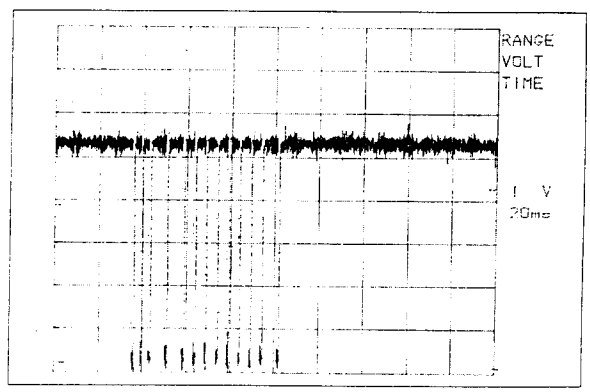

## 12. CONTROL CIRCUIT DIAGRAM A

**Test Point:** Pin 5 of U2

**Description:** The trace shows typical data out of the IR sensor; press keys on the handset to obtain the trace.

**If the trace is not as shown, check:**

- the handset;
- IR1.




## 13. CONTROL CIRCUIT DIAGRAM A

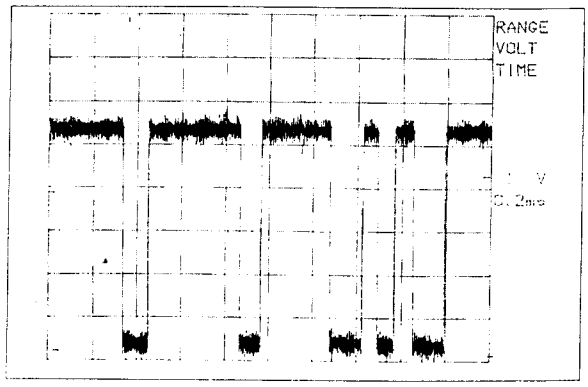
**Test Point:** Pin 36 of U2

**Description:** The trace shows a typical serial data (SDA) signal on the I²C bus when the handset keys are pressed to change the programme number.

Press the P-/-- key and/or numeric keys while looking for the trace.

**If the trace is not as shown, check:**

- U2 and any of the ICs on the I²C bus.



## 14. CONTROL CIRCUIT DIAGRAM A

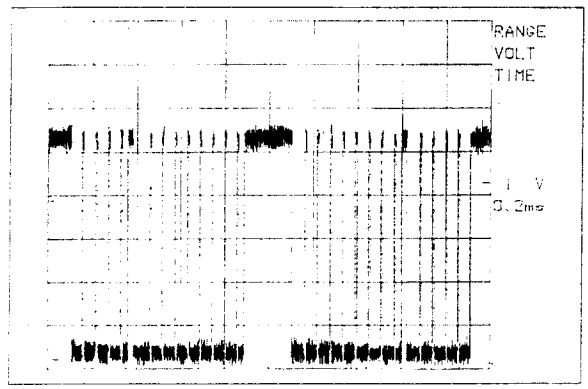
**Test Point:** Pin 37 of U2

**Description:** The trace shows a typical serial clock (SCL) signal on the I²C bus when the handset keys are pressed to change the programme number.

Press the P-/-- key and/or numeric keys while looking for the trace.

**If the trace is not as shown, check:**

- U2 and any of the ICs on the I²C bus.




## 15. SMPS CIRCUIT DIAGRAM B

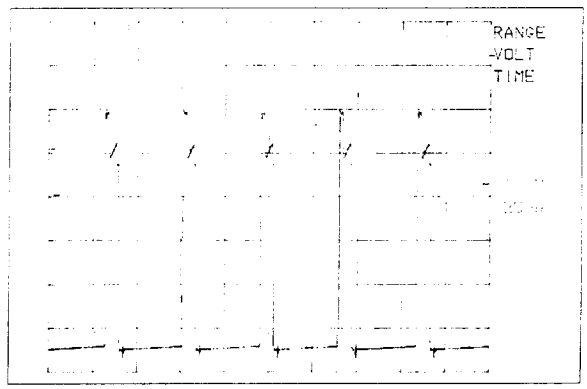
**WARNING: While you are making this measurement, you and the oscilloscope must not be earthed. Do not touch any metal parts of the oscilloscope.**

**Test Point:** Pin 5 of U1

**Description:** Although the oscilloscope is DC coupled, 0 V is at the centre of the oscillogram. The frequency of the trace will vary with the input voltage and the PSU load.

**If the trace is not as shown, TURN OFF THE PSU and check:**

- the components in the SMPS circuit.



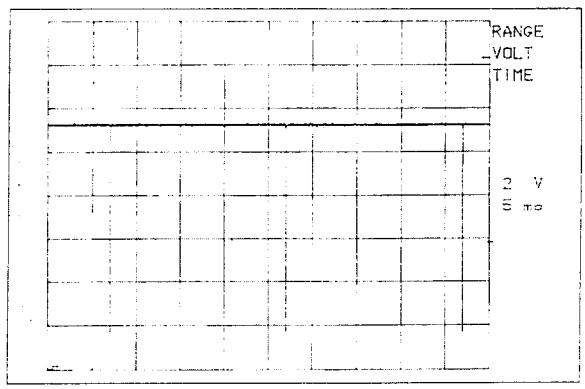

## 16. VIDEOCRYPT CIRCUIT DIAGRAM A

**Test Point:** Pin 15 of U18

**Description:** The trace shows the vertical sync. from the sync. sepatator circuitry (20 ms spacing).

**If the trace is not as shown, check:**

- U18 and associated circuitry.



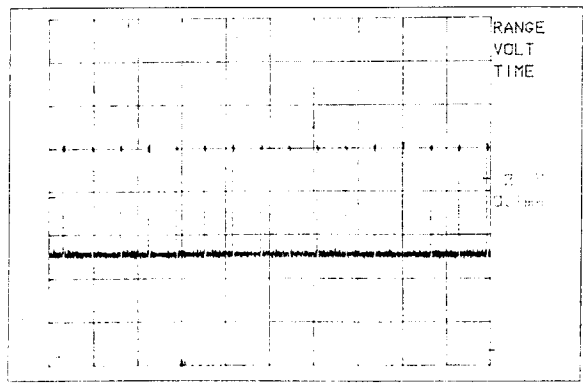

## 17. VIDEOCRYPT CIRCUIT DIAGRAM A

**Test Point:** Pin 12 of U18

**Description:** The trace shows the horizontal sync. from the sync. separator circuitry (64 µs spacing).

**If the trace is not as shown, check:**

- U18 and associated circuitry.



**Test Points:** Pins 4, 3, 2, 1, 18, 17, 16, 15 of U20

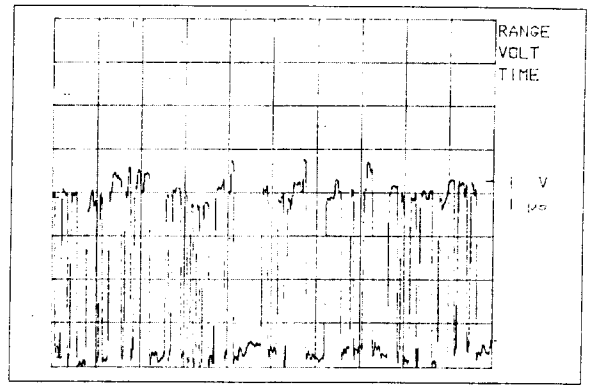
**Description:** The trace should look similar at all of the above test points, which are the outputs of the ADC.

Check that all 8 bits of data are present (one bit is associated with each of the above pins). Check that the data has a similar appearance by testing at pins 10, 9, 8, 7, 6, 5, 4, 3 respectively of U24 which are the equivalent DAC inputs.

**If the trace is not as shown, check:**

- the appropriate IC (U20 or U24).

**18. VIDEOCRYPT CIRCUIT DIAGRAM C**



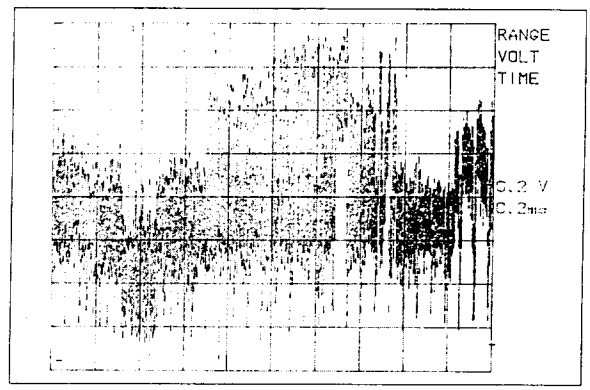

**Test Point:** Pin 13 of U24

**Description:** This is the raw video output from the DAC U24.

**If the trace is not as shown, check:**

- U24.

**19. VIDEOCRYPT CIRCUIT DIAGRAM C**



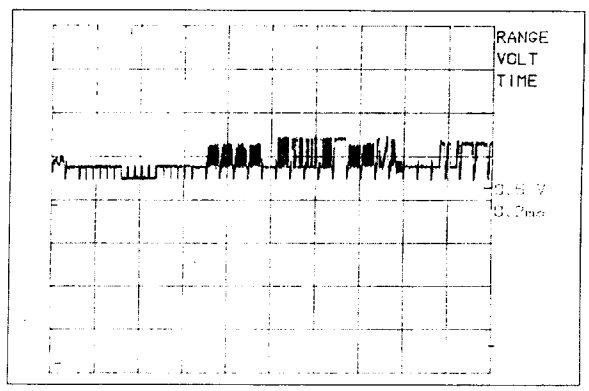

**Test Point:** Junction of R512 and R514

**Description:** This is a cleaned up version of the video signal shown in oscillogram 19 above (but note that they have different scales on the vertical axis).

**If the trace is not as shown, check:**

- Q34 and associated circuitry.

**20. VIDEOCRYPT CIRCUIT DIAGRAM C**




**Test Point:** Pin 4 of U19

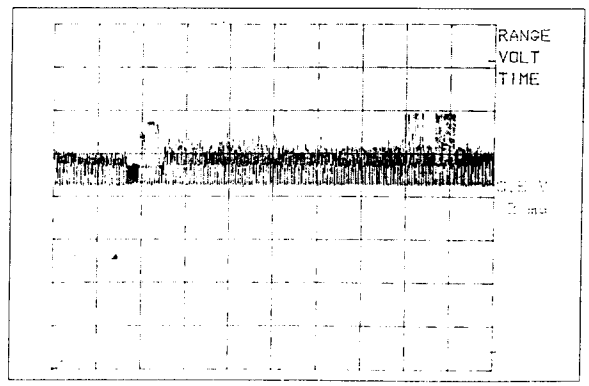
**Description:** The trace shows the video signal with a scale of 2 ms per division on the time axis. There are three areas of peaks. The first (leftmost) is the vertical sync. and VITS; the other two are the graphics. Oscillogram 21B (see next oscillogram) is a larger scale version of the graphics portion of oscillogram 21A.

The test needs to be carried out when an encrypted programme has been chosen but the viewng card is not inserted (so that graphics messages appear on the screen). Note the voltage level of the inserted graphics.

**If the voltage level is not as shown on the trace, check:**

- U19A, Q33, Q104 and associated circuitry.

**21A. VIDEOCRYPT CIRCUIT DIAGRAM A**

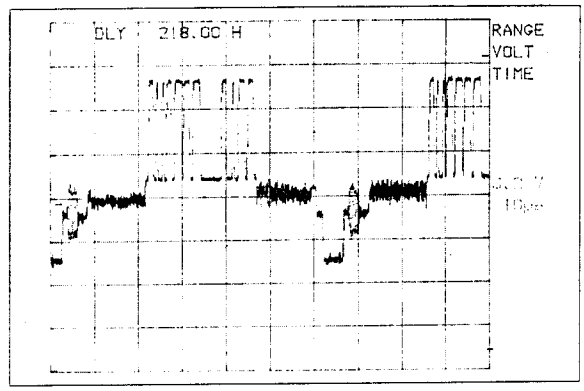


## 21B. VIDEOCRYPT CIRCUIT DIAGRAM A

**Test Point:** Pin 4 of U19

**Description:** AC coupled oscilloscope, 0 V in centre of oscillogram.

This is a larger scale version of the graphics portion of oscillogram 21A (see preceding oscillogram).



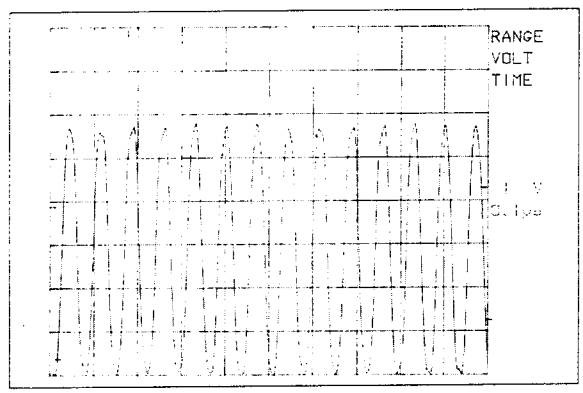

## 22. VIDEOCRYPT CIRCUIT DIAGRAM C

**Test Point:** Pin 2 of U24

**Description:** The trace shows the 14 MHz clock signal.

**If the trace is not as shown, check:**

- that X8 is oscillating at 28 MHz.




## 23. VIDEOCRYPT CIRCUIT DIAGRAM C

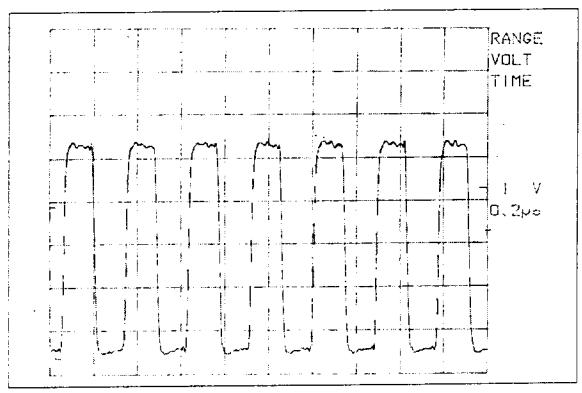
**Test Point:** Pin 5 of U28

**Description:** The trace shows the 3.5 MHz clock signal.

**If the trace is not as shown, check:**

- that there is a 7 MHz signal on pin 5 of U30.

Note that it is not permitted to swap out ICs U25, U27, U28 and U29.



# GRID REFERENCES - CIRCUIT DIAGRAM A

## CAPACITORS

| | |
|---|---|
| C29 | C4 |
| C30 | C4 |
| C31 | C4 |
| C32‡ | C4 |
| C33‡ | C4 |
| C34 | B6 |
| C36 | A7 |
| C37 | D5 |
| C40 | D7 |
| C41 | D8 |
| C42 | D7 |
| C43 | C8 |
| C44 | C8 |
| C45 | C7 |
| C46 | C8 |
| C47 | C7 |
| C48 | C7 |
| C49 | C7 |
| C53** | D8 |
| C54 | D8 |
| C55 | D7 |
| C56 | D7 |
| C57 | D6 |
| C58 | D7 |
| C59 | D7 |
| C61 | D8 |
| C62 | D7 |
| C63 | D8 |
| C65 | D8 |
| C66 | C8 |
| C67 | C8 |
| C70 | C7 |
| C71 | C5 |
| C72 | D6 |
| C75** | D6 |
| C77 | C7 |
| C78 | C7 |
| C79 | C6 |
| C83 | C8 |
| C86 | C8 |
| C87 | C8 |
| C90° | B8 |
| C91 | B8 |
| C95 | C6 |
| C96 | B6 |
| C97 | B6 |
| C98 | B6 |
| C99 | B6 |
| C100 | A7 |
| C101* | B8 |
| C102* | B8 |
| C103 | A7 |
| C104 | A6 |
| C105 | A6 |
| C106 | A6 |
| C107 | A5 |
| C108 | A6 |
| C109 | A6 |
| C110 | A5 |
| C111 | A5 |
| C112 | A7 |
| C113** | A7 |
| C114 | A5 |
| C115 | A4 |
| C116 | A7 |
| C117 | B4 |
| C118** | B4 |
| C119 | B3 |
| C120 | B3 |
| C121 | B4 |
| C122 | B4 |
| C123 | B4 |
| C124 | B3 |
| C126 | B3 |
| C127 | B2 |
| C128 | B3 |
| C129 | B3 |
| C130 | A3 |
| C131 | A2 |
| C132 | A2 |
| C133 | A2 |
| C134 | A2 |
| C135 | A2 |
| C144 | C6 |
| C150 | D7 |
| C193 | A7 |
| C194 | A8 |
| C195 | A8 |
| C196 | A4 |
| C204 | C2 |
| C205 | C2 |
| C206 | C2 |
| C207 | B2 |
| C208 | B2 |
| C209 | B2 |
| C210 | B2 |
| C211 | B2 |
| C212 | C1 |
| C213 | B1 |
| C214 | B1 |
| C215 | B1 |
| C216 | B1 |
| C244 | D6 |
| C258 | D6 |
| C259 | C6 |
| C260 | C7 |
| C261 | D7 |
| C262 | C6 |
| C263 | C7 |
| C277 | A8 |
| C278 | D1 |
| C279** | A7 |
| C280 | A7 |
| C281** | A7 |
| C286 | B2 |
| C294 | A1 |
| C297°* | B8 |
| C298* | B8 |
| C299** | B6 |
| C300 | A5 |
| C301 | C2 |
| C303** | A3 |
| C309 | B3 |
| C313 | A2 |
| C315** | A1 |
| C316** | A6 |
| C317** | A6 |
| C319 | B7 |
| C320 | C3 |
| C330 | D7 |
| C331** | D7 |
| C332 | D7 |
| C333** | D6 |
| C334 | D8 |
| C335 | D8 |
| C336 | C8 |
| C337 | C6 |
| C339 | C7 |
| C342 | A6 |
| C539 | C7 |
| C540 | C8 |
| C541 | D6 |
| C542 | C5 |
| C544 | A5 |
| C545 | A5 |
| C546 | A5 |
| C548** | B7 |
| C557 | A3 |
| C558** | A4 |
| C561° | B3 |
| C562 | A5 |
| C563 | C3 |

## DIODES

| | |
|---|---|
| D20 | C4 |
| D21 | C7 |
| D22 | D8 |
| D38 | A1 |
| D41 | A6 |
| D69 | B1 |
| D70 | A2 |
| D72* | B7 |
| D73* | A7 |
| D74* | B8 |
| D79 | C6 |

## INDUCTORS

| | |
|---|---|
| L4 | D6 |
| L5 | D8 |
| L6 | D8 |
| L7 | C6 |
| L8 | D6 |
| L10 | A6 |
| L11 | A6 |
| L12 | B3 |
| L28 | A2 |
| L29 | D1 |
| L30 | C8 |
| L31 | C8 |
| L50 | C7 |
| L51 | C7 |
| L55 | A3 |

## CONNECTORS

| | |
|---|---|
| PL3 | B7 |
| PL4 | A4 |
| PL5 | B7 |
| PL6 | B6 |

## TRANSISTORS

| | |
|---|---|
| Q4 | D1 |
| Q5 | D1 |
| Q6 | D1 |
| Q9 | C6 |
| Q10 | D7 |
| Q11 | D7 |
| Q15 | B6 |
| Q16* | B7 |
| Q17* | B7 |
| Q18 | A3 |
| Q19 | A3 |
| Q20 | A2 |
| Q21** | A2 |
| Q22 | A2 |
| Q23 | A1 |
| Q24 | A1 |
| Q25 | A1 |
| Q26 | A8 |
| Q27 | A6 |
| Q28** | D4 |
| Q31 | A7 |
| Q58* | B8 |
| Q59* | B8 |
| Q60* | B8 |
| Q61* | C8 |
| Q92 | A2 |
| Q93 | A1 |
| Q96 | D4 |
| Q97 | C6 |
| Q98 | C3 |
| Q100 | B7 |
| Q102 | A8 |
| Q105 | A8 |
| Q106 | A5 |
| Q107** | C5 |
| Q108 | A6 |
| Q109 | A5 |
| Q110 | A4 |

## RESISTORS

| | |
|---|---|
| R30 | D2 |
| R31 | D2 |
| R32** | D1 |
| R33** | D1 |
| R34 | D2 |
| R35 | D2 |
| R36 | D1 |
| R37 | D1 |
| R38 | D2 |
| R39 | D2 |
| R40 | D2 |
| R41 | D2 |
| R42 | D2 |
| R43 | D2 |
| R44 | C2 |
| R46 | C5 |
| R47 | C5 |
| R50 | C3 |
| R51 | C3 |
| R52 | C3 |
| R82 | D8 |
| R84 | D7 |
| R85 | D7 |
| R86 | D7 |
| R87 | C6 |
| R88 | C6 |
| R89 | C6 |
| R91 | D8 |
| R92 | D7 |
| R93 | D7 |
| R94 | D7 |
| R95 | D7 |
| R96 | D8 |
| R98 | D8 |
| R103 | D6 |
| R104 | C7 |
| R109 | C7 |
| R128 | B6 |
| R130 | B6 |
| R131 | B6 |
| R132 | B6 |
| R133 | B6 |
| R134 | B6 |
| R135 | B6 |
| R136* | B7 |
| R137* | B7 |
| R138* | B7 |
| R139* | B7 |
| R140* | B7 |
| R141* | B7 |
| R142 | A7 |
| R143 | A6 |
| R144 | A6 |
| R145 | A5 |
| R148 | B6 |
| R149 | A5 |
| R150 | A7 |
| R151 | B4 |
| R152 | B4 |
| R153 | B4 |
| R154 | B4 |
| R155 | B4 |
| R156 | B4 |
| R157 | B3 |
| R158 | B2 |
| R159 | B3 |
| R160 | B2 |
| R161 | A3 |
| R162** | A3 |
| R163 | A3 |
| R164 | A2 |
| R165 | B2 |
| R166 | A3 |
| R167 | A3 |
| R168 | A3 |
| R169 | A3 |
| R170 | A2 |
| R171 | A2 |
| R172 | A2 |
| R173 | A2 |
| R174 | A2 |
| R175 | A2 |
| R176 | A1 |
| R177 | A1 |
| R178 | A1 |
| R179 | A1 |
| R180 | A1 |
| R181 | A1 |
| R258 | A8 |
| R259 | A8 |
| R261 | A8 |
| R262 | A8 |
| R263 | A5 |
| R264 | A4 |
| R265 | A5 |
| R266 | A7 |
| R268 | A6 |
| R290** | D4 |
| R291** | D4 |
| R292** | D4 |
| R293** | D4 |
| R303 | B2 |
| R304 | B2 |
| R305 | B2 |
| R306 | B2 |
| R307 | B1 |
| R308 | C1 |
| R309 | C1 |
| R310 | C1 |
| R311 | C1 |
| R312 | B1 |
| R314 | A7 |
| R315 | A7 |
| R316 | A7 |
| R400 | A1 |
| R404 | D6 |
| R405 | D6 |
| R406 | D6 |
| R427 | D4 |
| R439** | C2 |
| R440 | A7 |
| R441 | A7 |
| R444 | B2 |
| R449 | A2 |
| R450 | A1 |
| R451 | A1 |
| R452 | A1 |
| R469 | D7 |
| R470** | D6 |
| R471 | D6 |
| R472 | D6 |
| R473 | D6 |
| R474** | D4 |
| R475 | A5 |
| R478* | B8 |
| R479* | B8 |
| R480* | B8 |
| R481* | B8 |
| R482* | B8 |
| R483* | B8 |
| R484* | C8 |
| R485* | C8 |
| R486* | C8 |
| R487* | B8 |
| R488* | B8 |
| R489* | C8 |
| R490** | A6 |
| R491** | A2 |
| R494 | C5 |
| R495 | A5 |
| R496** | A5 |
| R497 | A3 |
| R499 | C6 |
| R500 | C2 |
| R501 | B1 |
| R502 | B1 |
| R503 | C3 |
| R504 | C3 |
| R505 | C3 |
| R511** | D3 |
| R516 | A2 |
| R519 | A7 |
| R520 | B7 |
| R521 | B6 |
| R524** | B8 |
| R530 | C6 |
| R531 | D8 |
| R532 | C6 |
| R533 | C6 |
| R534 | D8 |
| R535 | A1 |
| R536 | A8 |
| R537 | A8 |
| R538 | A8 |
| R543 | B8 |
| R544 | B8 |
| R550* | D3 |
| R551** | D3 |
| R552* | D3 |
| R553** | D3 |
| R554** | D3 |
| R555** | D3 |
| R556** | D2 |
| R558 | A8 |
| R559 | A8 |
| R560 | A8 |
| R562 | A5 |
| R563 | A7 |
| R564 | D8 |
| R565 | D8 |
| R566 | D8 |
| R567 | D8 |
| R568 | D7 |
| R569 | C6 |
| R570 | C6 |
| R571 | C6 |
| R572 | C6 |
| R573 | C6 |
| R574 | C6 |
| R575 | C6 |
| R576 | C6 |
| R577 | C6 |
| R578 | C6 |
| R579 | B5 |
| R580 | D6 |
| R581 | C5 |
| R582 | D5 |
| R588 | B7 |
| R589§ | C8 |
| R592** | C5 |
| R593** | C5 |
| R596 | A6 |
| R597 | A5 |
| R598 | A5 |
| R600 | A5 |
| R601 | A6 |
| R602 | A6 |
| R603 | A4 |
| R604 | A4 |
| R605 | A4 |
| R606 | A4 |
| R607 | A4 |
| R612 | A4 |
| R613 | A4 |

## ICS

| | |
|---|---|
| U2 | C4 |
| U3 | D4 |
| U4 | D2 |
| U5 | D2 |
| U6 | B5 |
| U7 | C7 |
| U8 | C8 |
| U9 | A5 |
| U10 | B3 |
| U18 | B1 |
| U19B | A4 |
| U19C | B1 |

## MISC. COMPONENTS

| | |
|---|---|
| IR1 | D5 |
| IR2** | D5 |
| J5** | D2 |
| J6 | C6 |
| J7 | A6 |
| J12** | C5 |
| J13 | C5 |
| LED2** | D1 |
| LED3** | D5 |
| LED4** | D1 |
| LED5** | D1 |
| LED7** | D4 |
| LED8** | D1 |
| LED9 | D1 |
| LNB1 | B8 |
| LNB2 | B8 |
| MOD1 | B8 |
| S7 | A6 |
| S8 | B6 |
| S9 | B6 |
| S10 | A4 |
| S11 | A8 |
| S12 | B4 |
| S13 | B5 |
| SW2** | C5 |
| SW3** | C5 |
| SW4 | C5 |
| SW5 | C4 |
| SW6 | C4 |
| X1‡ | C4 |
| X2 | B3 |
| X7 | B2 |

** not fitted on either receiver

* not fitted on single input receiver

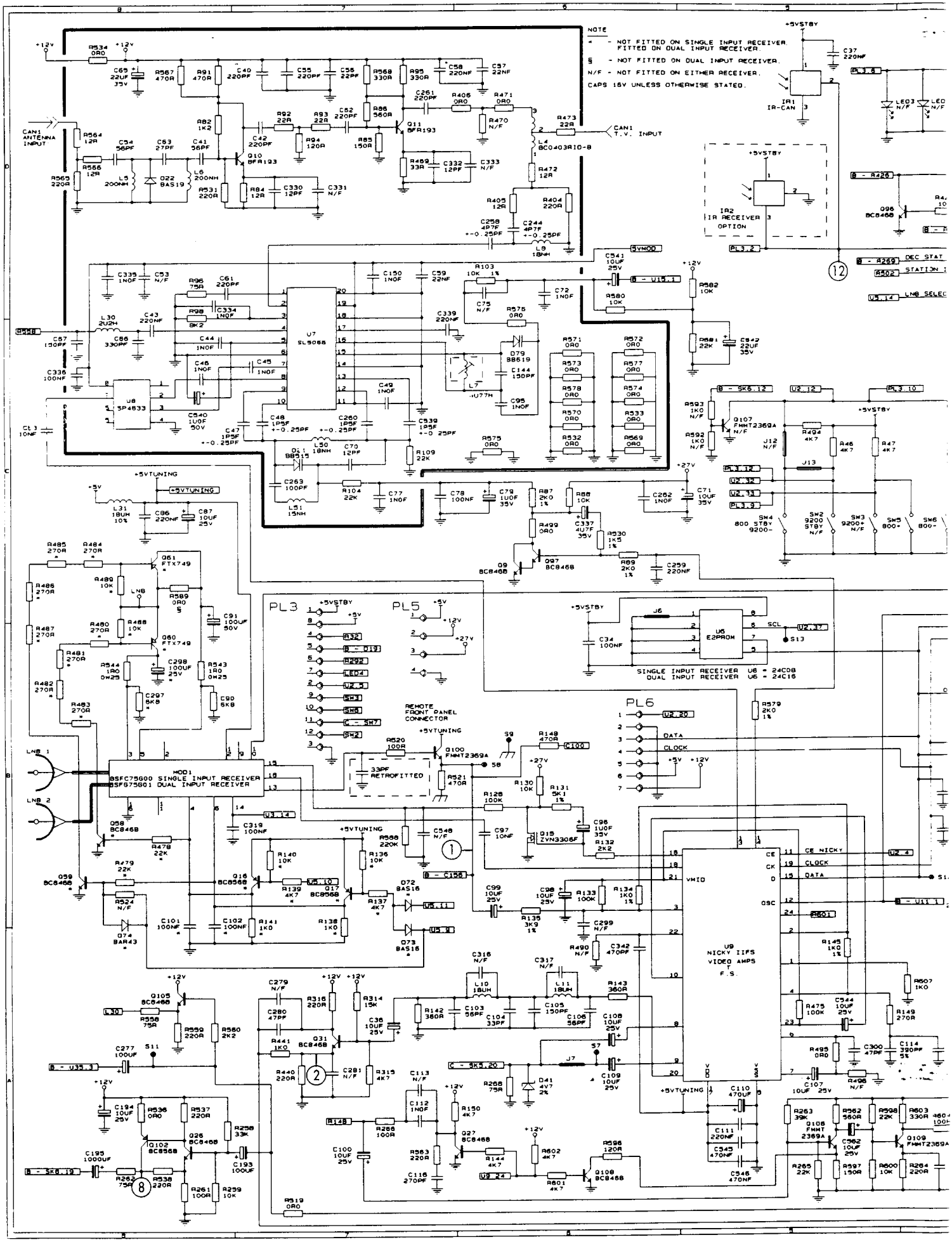
§ not fitted on dual input receiver

° actually a resistor (in a capacitor position)

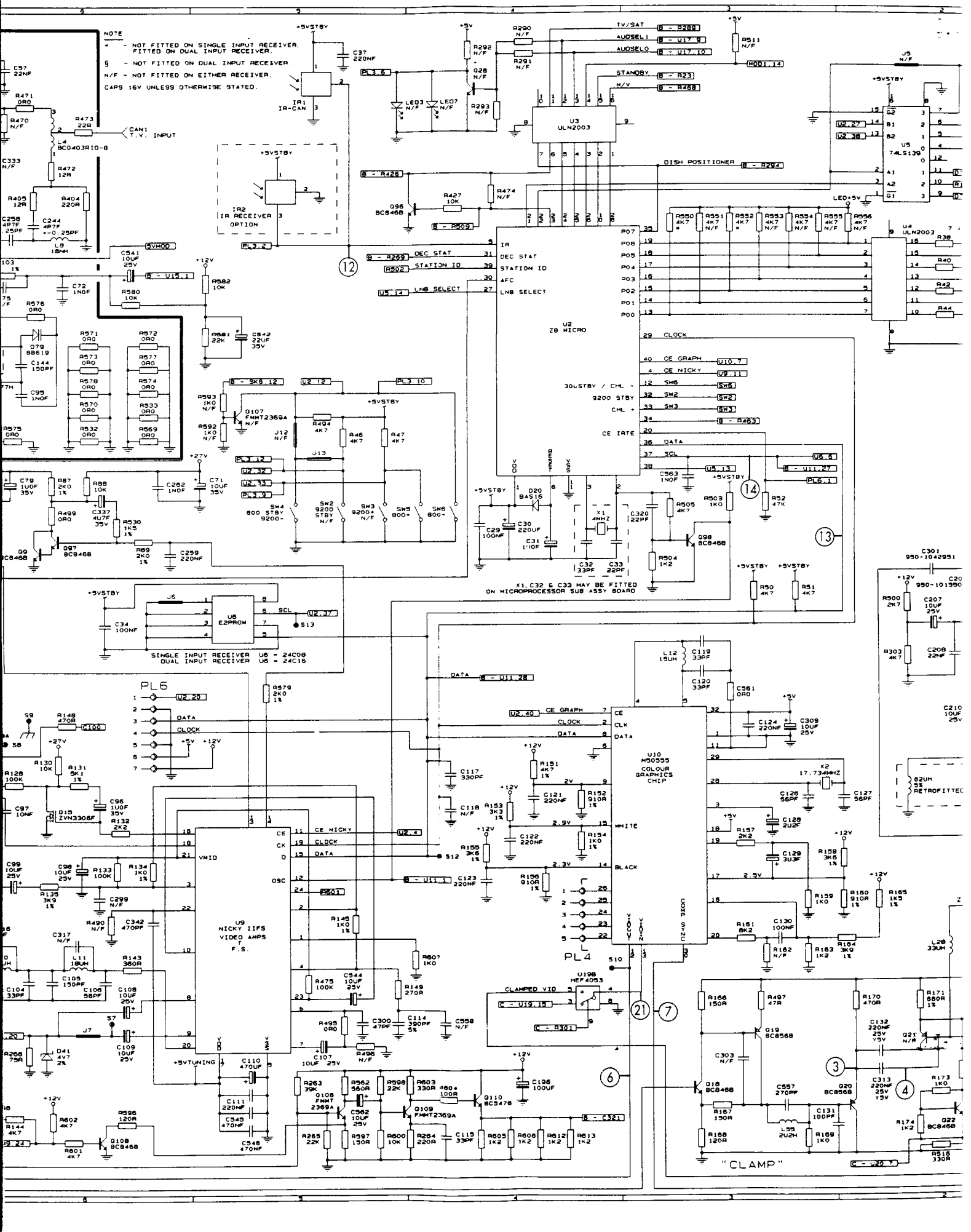
‡ may be mounted on µP sub-assembly board (NB: C32 as C5 and C33 as C6)

Retrofitted: 33 pF capacitor (B7)
82 µH inductor (B2)

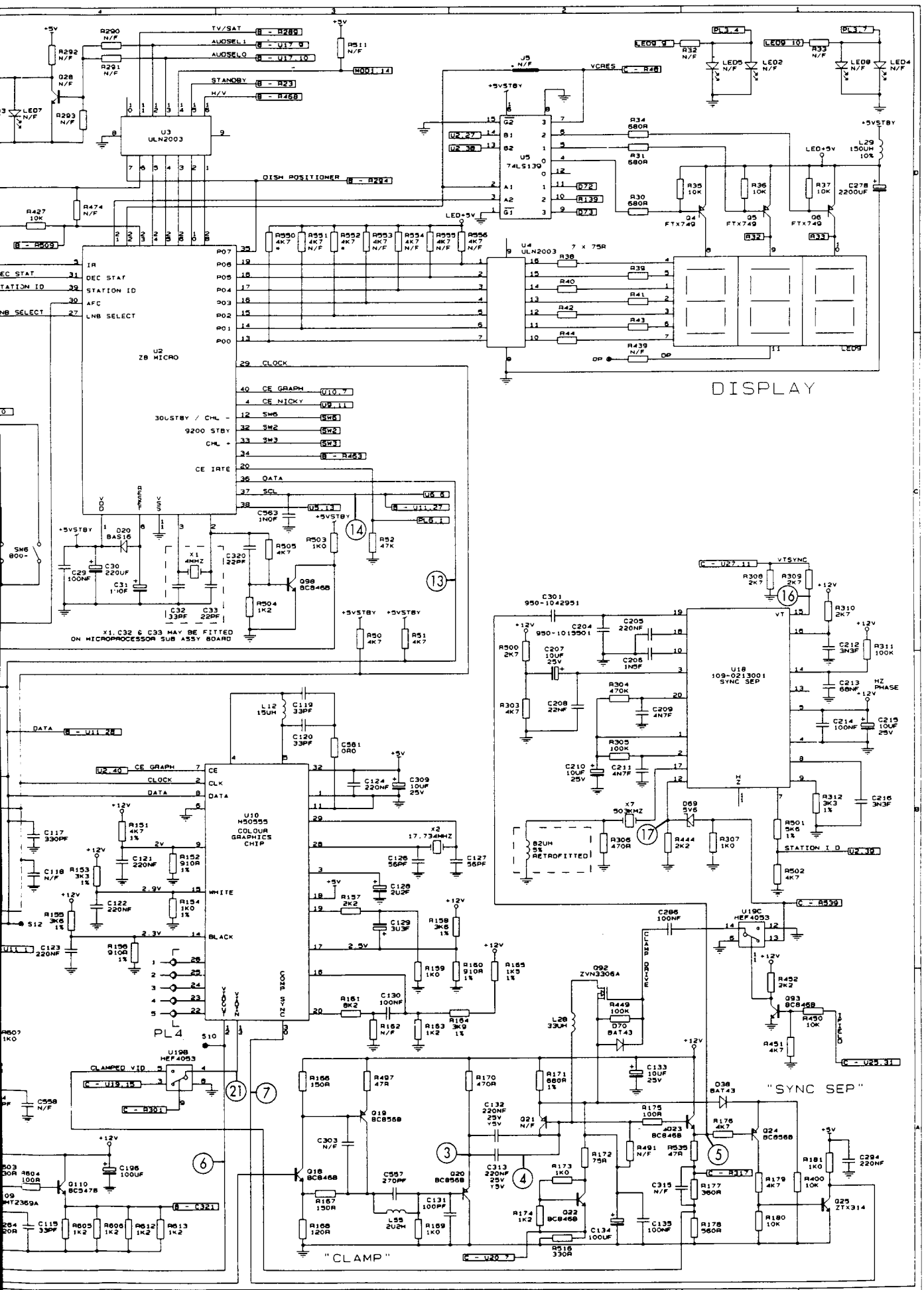
# CIRCUIT DIAGRAM A - TUNER, VIDEO PROCESSING, CONTROL AND UHF MODULATOR CIRCUIT



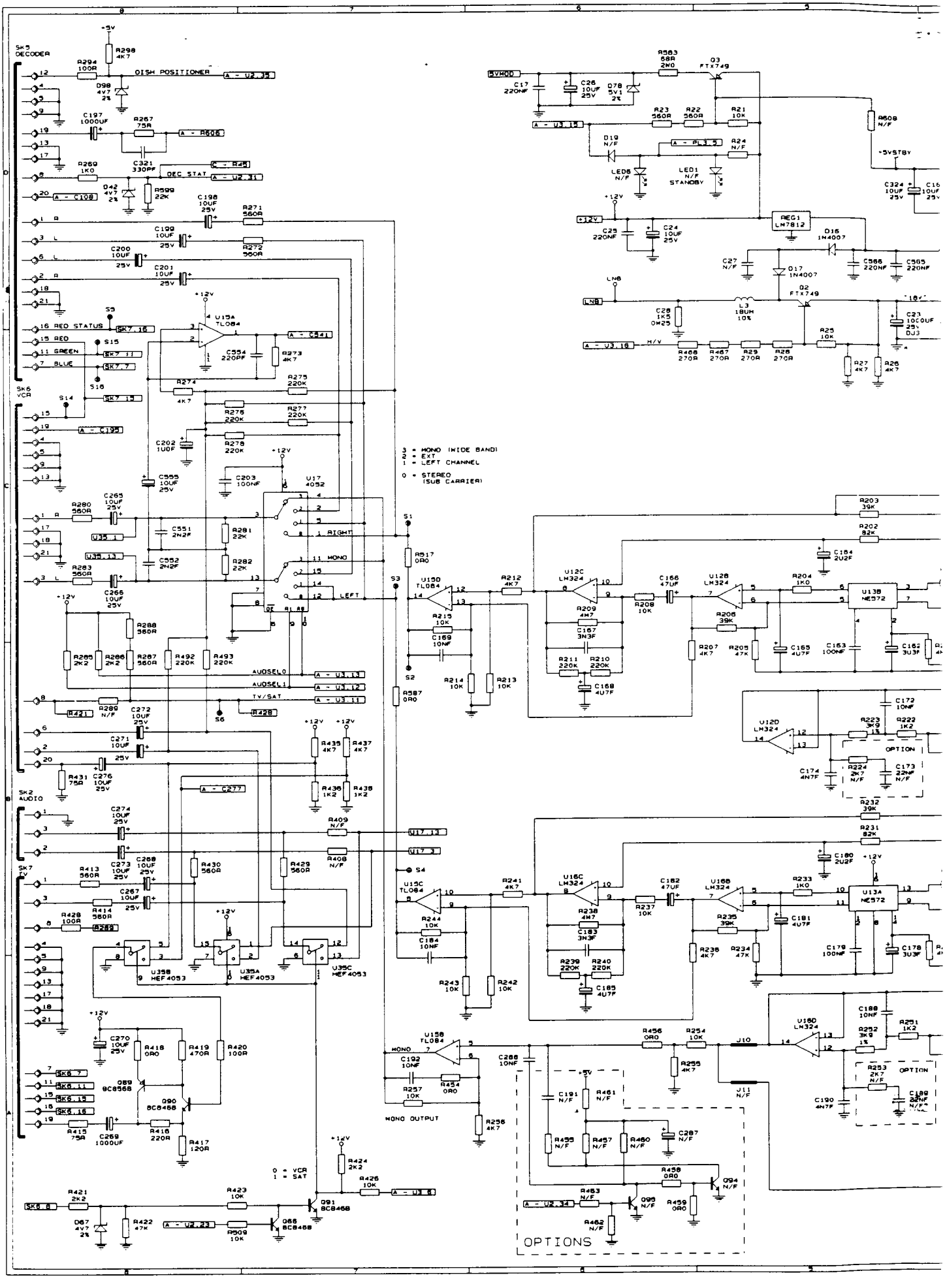
# NG, CONTROL AND UHF MODULATOR CIRCUITRY



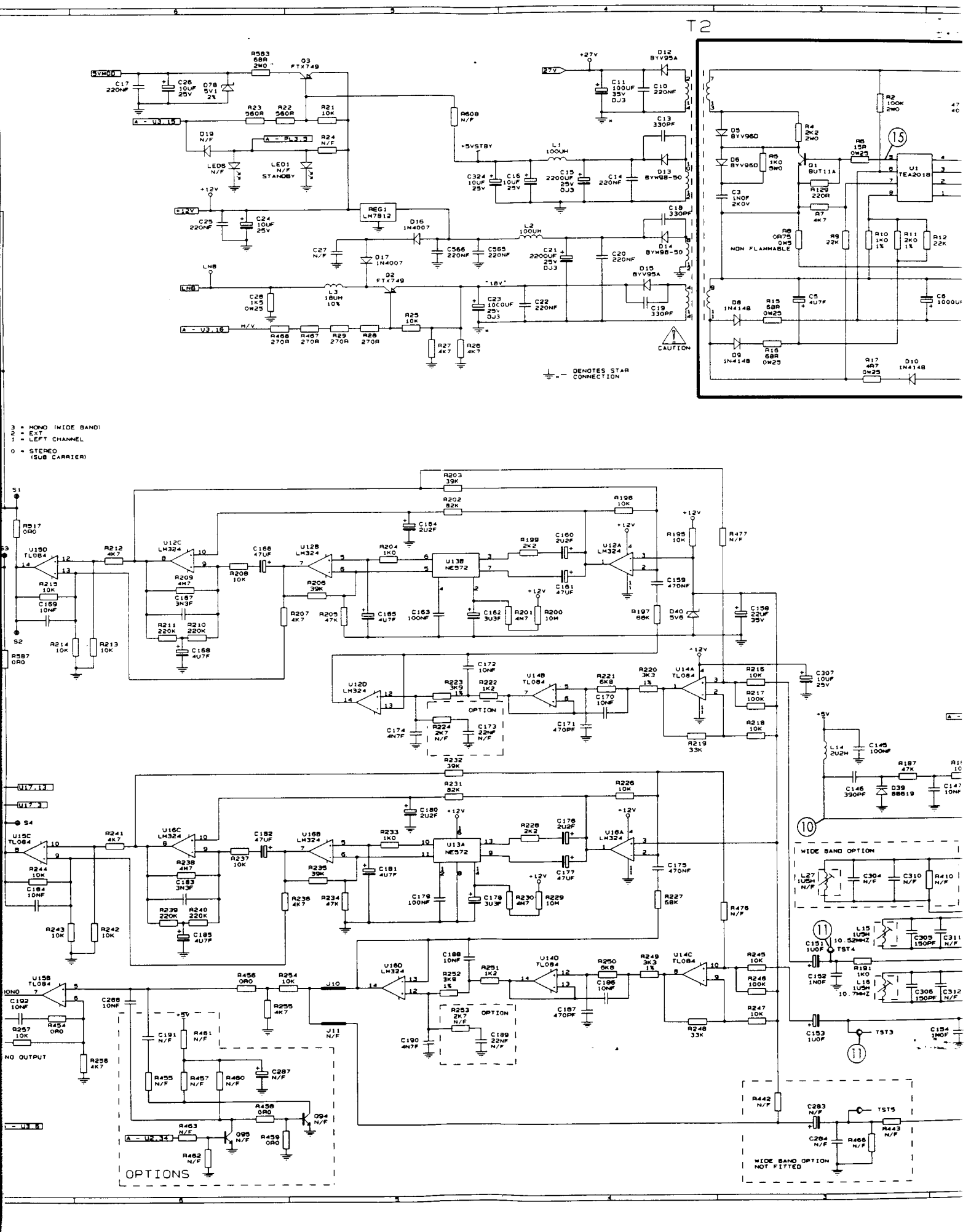
# UITRY


DISPLAY
"SYNC SEP"
"CLAMP"
U2 Z8 MICRO
U10 M50555 COLOUR GRAPHICS CHIP
U18 109-0213001 SYNC SEP
U3 ULN2003
U4 ULN2003
U5 74LS139
PL4
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY 80ARD
82UH 5% RETROFITTED
DISH POSITIONER
STATION ID
CLAMPED VID
TV/SAT
AUDSEL1
AUDSEL0
STANDBY
H/V
LNB SELECT
CE GRAPH
CLOCK
DATA
WHITE
BLACK
VTSYNC
HZ PHASE

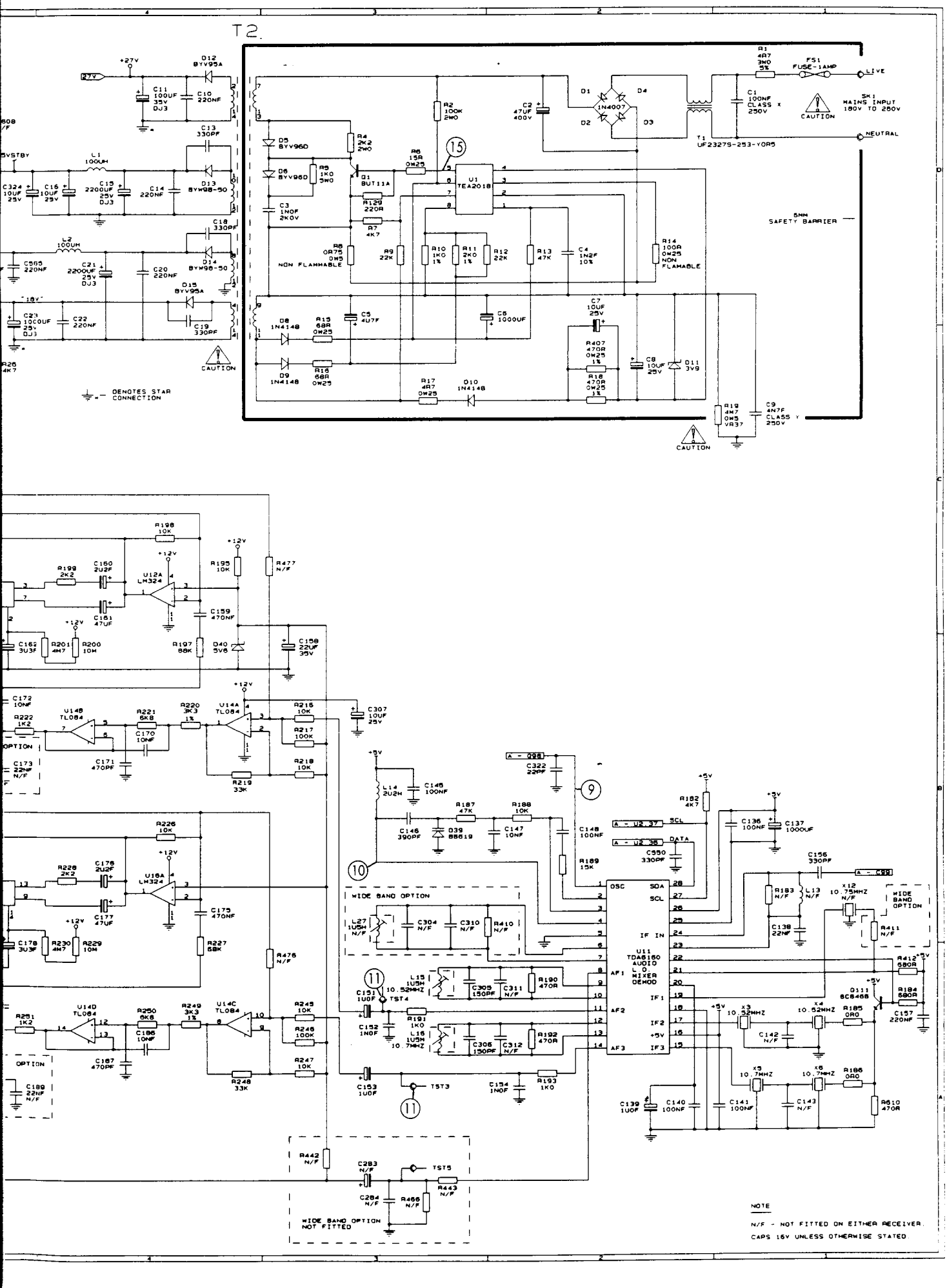
# CIRCUIT DIAGRAM B - AUDIO PROCESSING, SIGNAL ROUTING, SCART CONNECTORS AND P



# SING, SIGNAL ROUTING, SCART CONNECTORS AND POWER SUPPLY CIRCUITRY



# AND POWER SUPPLY CIRCUITRY



# GRID REFERENCES - CIRCUIT DIAGRAM B

## CAPACITORS

| | |
|---|---|
| C1 | D1 |
| C2 | D2 |
| C3 | D3 |
| C4 | D2 |
| C5 | D3 |
| C6 | D2 |
| C7 | D2 |
| C8 | C2 |
| C9 | C1 |
| C10 | D4 |
| C11 | D4 |
| C13 | D4 |
| C14 | D4 |
| C15 | D4 |
| C16 | D4 |
| C17 | D6 |
| C18 | D4 |
| C19 | D4 |
| C20 | D4 |
| C21 | D4 |
| C22 | D4 |
| C23 | D5 |
| C24 | D6 |
| C25 | D6 |
| C26 | D6 |
| C27** | D5 |
| C28° | D6 |
| C136 | B1 |
| C137 | B1 |
| C138 | B1 |
| C139 | A2 |
| C140 | A2 |
| C141 | A1 |
| C142** | A1 |
| C143** | A1 |
| C145 | B3 |
| C146 | B3 |
| C147 | B2 |
| C148 | B2 |
| C151 | A3 |
| C152 | A3 |
| C153 | A3 |
| C154 | A2 |
| C156 | B1 |
| C157 | A1 |
| C158 | B3 |
| C159 | C4 |
| C160 | C4 |
| C161 | C4 |
| C162 | B5 |
| C163 | B5 |
| C164 | C5 |
| C165 | B5 |
| C166 | C6 |
| C167 | B6 |
| C168 | B6 |
| C169 | B7 |
| C170 | B4 |
| C171 | B4 |
| C172 | B5 |
| C173** | B5 |
| C174 | B5 |
| C175 | B4 |
| C176 | B4 |
| C177 | B4 |
| C178 | A5 |
| C179 | A5 |
| C180 | B5 |
| C181 | B5 |
| C182 | B6 |
| C183 | B6 |
| C184 | A7 |
| C185 | A6 |
| C186 | A4 |
| C187 | A4 |
| C188 | A5 |
| C189** | A5 |
| C190 | A5 |
| C191** | A6 |
| C192 | A7 |
| C197 | D8 |
| C198 | D8 |
| C199 | D8 |
| C200 | D8 |
| C201 | D8 |
| C202 | C8 |
| C203 | C8 |
| C265 | C8 |
| C266 | C8 |
| C267 | B8 |
| C268 | B8 |
| C269 | A8 |
| C270 | A8 |
| C271 | B8 |
| C272 | B8 |
| C273 | B8 |
| C274 | B8 |
| C276 | B8 |
| C283** | A3 |
| C284** | A3 |
| C287** | A6 |
| C288 | A6 |
| C304** | B3 |
| C305 | A3 |
| C306 | A3 |
| C307 | B3 |
| C310** | B3 |
| C311** | A2 |
| C312** | A2 |
| C321 | D8 |
| C322 | B2 |
| C324 | D5 |
| C550 | B2 |
| C551 | C8 |
| C552 | C8 |
| C554 | C7 |
| C555 | C8 |
| C565 | D5 |
| C566 | D5 |

## DIODES

| | |
|---|---|
| D1 | D2 |
| D2 | D2 |
| D3 | D2 |
| D4 | D2 |
| D5 | D3 |
| D6 | D3 |
| D8 | C3 |
| D9 | C3 |
| D10 | C3 |
| D11 | C2 |
| D12 | D4 |
| D13 | D4 |
| D14 | D4 |
| D15 | D4 |
| D16 | D5 |
| D17 | D5 |
| D19** | D6 |
| D39 | B3 |
| D40 | B4 |
| D42 | D8 |
| D67 | A8 |
| D78 | D6 |
| D98 | D8 |

## INDUCTORS

| | |
|---|---|
| L1 | D4 |
| L2 | D4 |
| L3 | D5 |
| L13** | B1 |
| L14 | B3 |
| L15 | A3 |
| L16 | A3 |
| L27** | B3 |

## TRANSISTORS

| | |
|---|---|
| Q1 | D3 |
| Q2 | D5 |
| Q3 | D5 |
| Q66 | A7 |
| Q89 | A8 |
| Q90 | A8 |
| Q91 | A7 |
| Q94** | A5 |
| Q95** | A6 |
| Q111 | A1 |

## RESISTORS

| | |
|---|---|
| R1 | D1 |
| R2 | D3 |
| R4 | D3 |
| R5 | D3 |
| R6 | D3 |
| R7 | D3 |
| R8 | D3 |
| R9 | D3 |
| R10 | D3 |
| R11 | D3 |
| R12 | D2 |
| R13 | D2 |
| R14 | D2 |
| R15 | C3 |
| R16 | C3 |
| R17 | C3 |
| R18 | C2 |
| R19 | C1 |
| R21 | D5 |
| R22 | D6 |
| R23 | D6 |
| R24** | D5 |
| R25 | C5 |
| R26 | C5 |
| R27 | C5 |
| R28 | C5 |
| R29 | C5 |
| R129 | D3 |
| R182 | B2 |
| R183** | B1 |
| R184 | A1 |
| R185 | A1 |
| R186 | A1 |
| R187 | B3 |
| R188 | B2 |
| R189 | B2 |
| R190 | A2 |
| R191 | A3 |
| R192 | A2 |
| R193 | A2 |
| R195 | C4 |
| R197 | B4 |
| R198 | C4 |
| R199 | C4 |
| R200 | B4 |
| R201 | B4 |
| R202 | C5 |
| R203 | C5 |
| R204 | C5 |
| R205 | B5 |
| R206 | C5 |
| R207 | B6 |
| R208 | C6 |
| R209 | C6 |
| R210 | B6 |
| R211 | B6 |
| R212 | C6 |
| R213 | B6 |
| R214 | B6 |
| R215 | C7 |
| R216 | B3 |
| R217 | B3 |
| R218 | B3 |
| R219 | B4 |
| R220 | B4 |
| R221 | B4 |
| R222 | B5 |
| R223 | B5 |
| R224** | B5 |
| R226 | B4 |
| R227 | A4 |
| R228 | B4 |
| R229 | A4 |
| R230 | A4 |
| R231 | B5 |
| R232 | B5 |
| R233 | B5 |
| R234 | A5 |
| R235 | B5 |
| R236 | B6 |
| R237 | B6 |
| R238 | B6 |
| R239 | A6 |
| R240 | A6 |
| R241 | B6 |
| R242 | A6 |
| R243 | A7 |
| R244 | B7 |
| R245 | A3 |
| R246 | A3 |
| R247 | A3 |
| R248 | A4 |
| R249 | A4 |
| R250 | A4 |
| R251 | A5 |
| R252 | A5 |
| R253** | A5 |
| R254 | A5 |
| R255 | A6 |
| R256 | A6 |
| R257 | A7 |
| R267 | D8 |
| R269 | D8 |
| R271 | D7 |
| R272 | D7 |
| R273 | C7 |
| R274 | C8 |
| R275 | C7 |
| R276 | C8 |
| R277 | C7 |
| R278 | C8 |
| R280 | C8 |
| R281 | C8 |
| R282 | C8 |
| R283 | C8 |
| R285 | B8 |
| R286 | B8 |
| R287 | B8 |
| R288 | C8 |
| R289** | B8 |
| R294 | D8 |
| R298 | D8 |
| R407 | C2 |
| R408** | B7 |
| R409** | B7 |
| R410** | B2 |
| R411** | B1 |
| R412 | A1 |
| R413 | B8 |
| R414 | B8 |
| R415 | A8 |
| R416 | A8 |
| R417 | A8 |
| R418 | A8 |
| R419 | A8 |
| R420 | A8 |
| R421 | A8 |
| R422 | A8 |
| R423 | A8 |
| R424 | A7 |
| R426 | A7 |
| R428 | B8 |
| R429 | B7 |
| R430 | B8 |
| R431 | B8 |
| R435 | B7 |
| R436 | B7 |
| R437 | B7 |
| R438 | B7 |
| R442** | A3 |
| R443** | A3 |
| R454 | A7 |
| R455** | A6 |
| R456 | A6 |
| R457** | A6 |
| R458 | A6 |
| R459 | A6 |
| R460** | A6 |
| R461** | A6 |
| R462** | A6 |
| R463** | A6 |
| R466** | A3 |
| R467 | C5 |
| R468 | C6 |
| R476** | A3 |
| R477** | C3 |
| R492 | B8 |
| R493 | B8 |
| R509 | A8 |
| R517 | C7 |
| R583 | D6 |
| R587 | B7 |
| R599 | D8 |
| R608** | D5 |
| R610 | A1 |

## CONNECTORS

| | |
|---|---|
| SK1 | D1 |
| SK2 | B8 |
| SK5 | D8 |
| SK6 | C8 |
| SK7 | A8 |

## ICS

| | |
|---|---|
| U1 | D3 |
| U11 | A2 |
| U12A | C4 |
| U12B | C5 |
| U12C | C6 |
| U12D | B5 |
| U13A | B5 |
| U13B | C5 |
| U14A | B4 |
| U14B | B4 |
| U14C | A4 |
| U14D | A4 |
| U15A | C8 |
| U15B | A7 |
| U15C | B7 |
| U15D | C7 |
| U16A | B4 |
| U16B | B5 |
| U16C | B6 |
| U16D | A5 |
| U17 | C7 |
| U35A | B8 |
| U35B | B8 |
| U35C | B7 |

## MISC. COMPONENTS

| | |
|---|---|
| FS1 | D1 |
| J10 | A5 |
| J11** | A5 |
| LED1** | D5 |
| LED6** | D6 |
| REG1 | D5 |
| S1 | C7 |
| S2 | B7 |
| S3 | C7 |
| S4 | B7 |
| S5 | D8 |
| S6 | B8 |
| S14 | C8 |
| S15 | C8 |
| S16 | C8 |
| T1 | D2 |
| T2 | D4 |
| TST3 | A3 |
| TST4 | A3 |
| TST5 | A3 |
| X3 | A1 |
| X4 | A1 |
| X5 | A1 |
| X6 | A1 |
| X12** | B1 |

* ** not fitted on either receiver
* * not fitted on single input receiver
§ not fitted on dual input receiver
° actually a resistor (in a capacitor position)

# GRID REFERENCES - MAIN PCB

## CAPACITORS

| | |
|---|---|
| C1 | A5 |
| C2 | B5 |
| C3 | B5 |
| C4 | B1† |
| C5 | A5 |
| C6 | A5 |
| C7 | B5 |
| C8 | B5 |
| C9 | C4 |
| C10 | C1† |
| C11 | C5 |
| C13 | C1† |
| C14 | C1† |
| C15 | C5 |
| C16 | C4 |
| C17 | B2† |
| C18 | C1† |
| C19 | C1† |
| C20 | C1† |
| C21 | C5 |
| C22 | C1† |
| C23 | C5 |
| C24 | D5 |
| C25 | D1† |
| C26 | B4 |
| C27** | D1† |
| C28° | D5 |
| C29 | D2† |
| C30 | D4 |
| C31 | D4 |
| C32‡ | D2† |
| C33‡ | D2† |
| C34 | D2† |
| C35 | D4† |
| C36 | A3 |
| C37 | D1† |
| C38** | C2† |
| C39** | C4 |
| C40 | A2† |
| C41 | A2† |
| C42 | A2† |
| C43 | B2† |
| C44 | B2† |
| C45 | B2† |
| C46 | B2† |
| C47 | B2† |
| C48 | B2† |
| C49 | B2† |
| C53** | B2† |
| C54 | A2† |
| C55 | A2† |
| C56 | A2† |
| C57 | A2† |
| C58 | A2† |
| C59 | B2† |
| C61 | B2† |
| C62 | A2† |
| C63 | A2† |
| C65 | A4 |
| C66 | B2† |
| C67 | B2† |
| C70 | B2† |
| C71 | B4 |
| C72 | B2† |
| C75** | B2† |
| C77 | B2† |
| C78 | B2† |
| C79 | B4 |
| C83 | B3† |
| C86 | B3† |
| C87 | B3 |
| C90° | A2† |
| C91 | A3 |
| C95 | B2† |
| C96 | B3 |
| C97 | B3† |
| C98 | B3 |
| C99 | B3 |
| C100 | A3 |
| C101* | A2† |
| C102* | A2† |
| C103 | A3† |
| C104 | B3† |
| C105 | B3† |
| C106 | B3† |
| C107 | B3 |
| C108 | B3 |
| C109 | B3 |
| C110 | B3 |
| C111 | B3† |
| C112 | A3† |
| C113** | A3† |
| C114 | B3† |
| C115 | A3† |
| C116 | *A3† |
| C117 | B3† |
| C118** | B3† |
| C119 | B4† |
| C120 | B4† |
| C121 | C3† |
| C122 | C3† |
| C123 | C4† |
| C124 | C3† |
| C125 | C3 |
| C126 | B3† |
| C127 | B3† |
| C128 | B2 |
| C129 | C3 |
| C130 | C3† |
| C131 | B3† |
| C132 | B3† |
| C133 | B3 |
| C134 | B3 |
| C135 | B3† |
| C136 | B4† |
| C137 | A2 |
| C138 | B4† |
| C139 | B2 |
| C140 | B4† |
| C141 | B4† |
| C142** | A4† |
| C143** | A4† |
| C144 | B2† |
| C145 | B4† |
| C146 | B4† |
| C147 | B4† |
| C148 | B4† |
| C150 | B2† |
| C151 | B2 |
| C152 | B4† |
| C153 | B2 |
| C154 | B4† |
| C156 | A4† |
| C157 | B4† |
| C158 | B2 |
| C159 | C4† |
| C160 | B1 |
| C161 | B1 |
| C162 | C1 |
| C163 | B5† |
| C164 | B1 |
| C165 | B1 |
| C166 | B2 |
| C167 | B4† |
| C168 | B1 |
| C169 | B5† |
| C170 | B4† |
| C171 | B4† |
| C172 | B4† |
| C173** | B4† |
| C174 | B4† |
| C175 | B5† |
| C176 | B1 |
| C177 | B1 |
| C178 | C1 |
| C179 | B5† |
| C180 | B1 |
| C181 | B1 |
| C182 | B1 |
| C183 | B5† |
| C184 | B5† |
| C185 | B1 |
| C186 | B4† |
| C187 | B4† |
| C188 | B5† |
| C189** | B5† |
| C190 | B5† |
| C191** | C5† |
| C192 | A5† |
| C193 | B2 |
| C194 | C1 |
| C195 | B2 |
| C196 | A3 |
| C197 | A3 |
| C198 | A2 |
| C199 | A2 |
| C200 | A2 |
| C201 | A2 |
| C202 | B1 |
| C203 | B5† |
| C204 | D3† |
| C205 | D3† |
| C206 | C3† |
| C207 | D4 |
| C208 | D3† |
| C209 | D3† |
| C210 | D4 |
| C211 | D3† |
| C212 | D3† |
| C213 | D3† |
| C214 | D3† |
| C215 | D4 |
| C216 | D3† |
| C219 | C3† |
| C220 | D4† |
| C221 | C3 |
| C222 | C3† |
| C225 | D3† |
| C227 | C3† |
| C228 | C3† |
| C229 | C3† |
| C230 | C3† |
| C231 | C3 |
| C232 | C3† |
| C233 | C3 |
| C235 | C4† |
| C236 | C4† |
| C237** | C4† |
| C238 | C4† |
| C239 | C4† |
| C240 | C4† |
| C241 | C4† |
| C242 | C4† |
| C243 | D3† |
| C244 | A2† |
| C245 | D3† |
| C246 | D4† |
| C247 | D4† |
| C248 | D4† |
| C249 | D2 |
| C250 | D4† |
| C251 | C4† |
| C252 | C5† |
| C253 | C5† |
| C254 | C2 |
| C255 | D5† |
| C256 | D5† |
| C257 | D3 |
| C258 | B2† |
| C259 | B2† |
| C260 | B2† |
| C261 | A2† |
| C262 | B2† |
| C263 | B2† |
| C265 | A1 |
| C266 | A1 |
| C267 | A2 |
| C268 | A1 |
| C269 | A2 |
| C270 | B2 |
| C271 | A1 |
| C272 | A1 |
| C273 | A3 |
| C274 | A3 |
| C276 | A2 |
| C277 | B2 |
| C278 | D5 |
| C279** | B3† |
| C280 | B3† |
| C281** | B3† |
| C283** | B2 |
| C284** | B4† |
| C286 | C3† |
| C287** | B1 |
| C288 | C5† |
| C289 | B1 |
| C294 | C3† |
| C297** | A2† |
| C298* | A3 |
| C299** | B3† |
| C300 | B3† |
| C301 | D3† |
| C303** | B3† |
| C304** | B4† |
| C305 | B4† |
| C306 | B4† |
| C307 | B2 |
| C309 | B3 |
| C310** | B2 |
| C311** | B2 |
| C312** | B2 |
| C313 | B3† |
| C315** | C3† |
| C316** | B3† |
| C317** | B3† |
| C318 | C2 |
| C319 | B2† |
| C320 | D2† |
| C321 | A3† |
| C322 | B4† |
| C324 | C4 |
| C325 | C3† |
| C326 | C3† |
| C327 | C3† |
| C330 | A2† |
| C331** | A2† |
| C332 | A2† |
| C333** | A2† |
| C334 | B2† |
| C335 | B2† |
| C336 | B2† |
| C337 | B4 |
| C339 | B2† |
| C340 | C4† |
| C341** | C4† |
| C342 | B3† |
| C539 | B2† |
| C540 | B4 |
| C541 | B4 |
| C542 | B4 |
| C544 | B3 |
| C545 | B3† |
| C546 | B3† |
| C548** | B2† |
| C549 | C4† |
| C550 | B4† |
| C551 | B5† |
| C552 | B5† |
| C553 | C3† |
| C554 | B5† |
| C555 | B1 |
| C556° | C5† |
| C557 | B3† |
| C558** | B3† |
| C559 | C3† |
| C560** | C3† |
| C561° | C4† |
| C562 | A3 |
| C563 | D2† |
| C564** | C3† |
| C565 | D1† |
| C566 | D1† |
| C567 | C5† |

## DIODES

| | |
|---|---|
| D1 | B5 |
| D2 | B5 |
| D3 | B5 |
| D4 | B5 |
| D5 | B4 |
| D6 | B4 |
| D8 | B4 |
| D9 | B4 |
| D10 | B5 |
| D11 | B5 |
| D12 | C5 |
| D13 | C5 |
| D14 | C5 |
| D15 | C5 |
| D16 | D5 |
| D17 | D5 |
| D19** | C4 |
| D20 | D2† |
| D21 | B2† |
| D22 | A2† |
| D29** | C2† |
| D30** | C2† |
| D31** | C4 |
| D32** | C4 |
| D38 | B3 |
| D39 | B4† |
| D40 | B2 |
| D41 | B3 |
| D42 | A3 |
| D43 | C3 |
| D44 | C3 |
| D48** | C4† |
| D49 | C4† |
| D50 | C4† |
| D51 | D4† |
| D52 | C2 |
| D53 | C2 |
| D54 | C2 |
| D55 | C2 |
| D56 | D5† |
| D57 | D5† |
| D58 | D5† |
| D59 | C1 |
| D60 | C5† |
| D61 | C5† |
| D62 | D2 |
| D63 | D2 |
| D64 | D5† |
| D65 | D5† |
| D66 | C1 |
| D67 | A1 |
| D69 | D3 |
| D70 | C3 |
| D72* | C2† |
| D73* | B2† |
| D74* | A2† |
| D75** | C4 |
| D76 | C3 |
| D77 | D3 |
| D78 | B4 |
| D79 | B2† |
| D80** | C2† |
| D96 | C5† |
| D97 | C5† |
| D98 | A3 |
| D100 | C3† |
| D101** | C2† |

## INDUCTORS

| | |
|---|---|
| L1 | C4 |
| L2 | D5 |
| L3 | D5 |
| L4 | A4 |
| L5 | A4 |
| L6 | A4 |
| L7 | B4 |
| L8 | B4 |
| L10 | B3 |
| L11 | B3 |
| L12 | B2 |
| L13** | A2 |
| L14 | B2 |
| L15 | B2 |
| L16 | B2 |
| L19 | C3 |
| L20 | D3 |
| L21 | C3 |
| L22 | C3 |
| L23 | C3 |
| L24 | C3 |
| L25 | C2 |
| L26 | D2 |
| L27** | B2 |
| L28 | C3 |
| L29 | D5 |
| L30 | B4 |
| L31 | B4 |
| L50 | B4 |
| L51 | B4 |
| L52 | C2 |
| L53 | C2 |
| L54 | C2 |
| L55 | B3 |

## CONNECTORS

| | |
|---|---|
| PL1 | C1 |
| PL2** | C3 |
| PL3 | D4 |
| PL4 | C3 |
| PL5 | D5 |
| PL6 | B3 |
| SK1 | A5 |
| SK2 | A3 |
| SK5 | A3 |
| SK6 | A1 |
| SK7 | A2 |

## TRANSISTORS

| | |
|---|---|
| Q1 | B5 |
| Q2 | D5 |
| Q3 | C4 |
| Q4 | D4 |
| Q5 | D5 |
| Q6 | D5 |
| Q7 | D4† |
| Q8 | D4† |
| Q9 | B2† |
| Q10 | A2† |
| Q11 | A2† |
| Q15 | B3† |
| Q16* | A2† |
| Q17* | A2† |
| Q18 | B3† |
| Q19 | B3† |
| Q20 | B3† |
| Q21** | C3† |
| Q22 | B3† |
| Q23 | C3† |
| Q24 | C3† |
| Q25 | C3 |
| Q26 | B4† |
| Q27 | A3† |
| Q28** | D3† |
| Q30 | B3† |
| Q31 | B3† |
| Q32 | C3† |
| Q33 | C3† |
| Q34 | C3† |
| Q35 | D5† |
| Q36 | D5† |
| Q37 | D5† |
| Q38 | D5† |
| Q39 | C5† |
| Q40 | C5† |
| Q41 | C5† |
| Q42 | C1 |
| Q43 | D2 |
| Q44 | D5† |
| Q45 | D5† |
| Q46** | C2† |
| Q47** | C2† |
| Q48** | C2† |
| Q49** | C2† |
| Q50** | C2† |
| Q51** | C2† |
| Q52** | C2† |
| Q53** | C2† |
| Q58* | A3† |
| Q59* | B2† |
| Q60* | A3 |
| Q61* | A3 |
| Q66 | A5† |
| Q89 | B4† |
| Q90 | B4† |
| Q91 | A5† |
| Q92 | C3 |
| Q93 | C3† |
| Q94** | B5† |
| Q95** | B5† |
| Q96 | C2† |
| Q97 | B2† |
| Q98 | D2† |
| Q99 | C3† |
| Q100 | A3† |
| Q102 | B4† |
| Q103 | C2 |
| Q104 | C3† |
| Q105 | B3† |
| Q106 | A3† |
| Q107** | D5† |
| Q108 | A3† |
| Q109 | A3† |
| Q110 | A3 |
| Q111 | A4† |

## RESISTORS

| | |
|---|---|
| R1 | A5 |
| R2 | B5 |
| R4 | B5 |
| R5 | B5 |
| R6 | A5 |
| R7 | A1† |
| R8 | B5 |
| R9 | B2† |
| R10 | A1† |
| R11 | A1† |
| R12 | A1† |
| R13 | A1† |
| R14 | B5 |
| R15 | A4 |
| R16 | A4 |
| R17 | B5 |
| R18 | B5 |
| R19 | B4 |
| R21 | D1† |
| R22 | C2† |
| R23 | C2† |
| R24** | C2† |
| R25 | D1† |
| R26 | C1† |
| R27 | C1† |
| R28 | D1† |
| R29 | D1† |
| R30 | D2† |
| R31 | D2† |
| R32** | D1† |
| R33** | D2† |
| R34 | D2† |
| R35 | D2† |
| R36 | D1† |
| R37 | D1† |
| R38 | D2† |
| R39 | D2† |
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| R41 | D2† |
| R42 | D2† |
| R43 | D2† |
| R44 | D2† |
| R45 | B3† |
| R46 | D2† |
| R47 | D2† |
| R48 | D4† |
| R49 | D4† |
| R50 | C2† |
| R51 | D2† |
| R52 | C2† |
| R53** | C2† |
| R54** | C2† |
| R55** | C2† |
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| R57** | C2† |
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| R81** | C3† |
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| R91 | A2† |
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| R492 | B5† |
| R493 | B5† |
| R494 | D2† |
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| R496** | B3† |
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| R545 | C3† |
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| R581 | B2† |
| R582 | B2† |
| R583 | C4 |
| R584 | D4† |
| R585 | D4† |
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| R587 | A5† |
| R588 | B2† |
| R589§ | A3† |
| R590 | C3† |
| R591 | C2† |
| R592** | D5† |
| R593** | D5† |
| R594 | C3† |
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| R605 | A3† |
| R606 | A3† |
| R607 | B3† |
| R608** | C2† |
| R609 | D5† |
| R610 | A4† |
| R612 | A3† |
| R613 | A3† |

## ICS

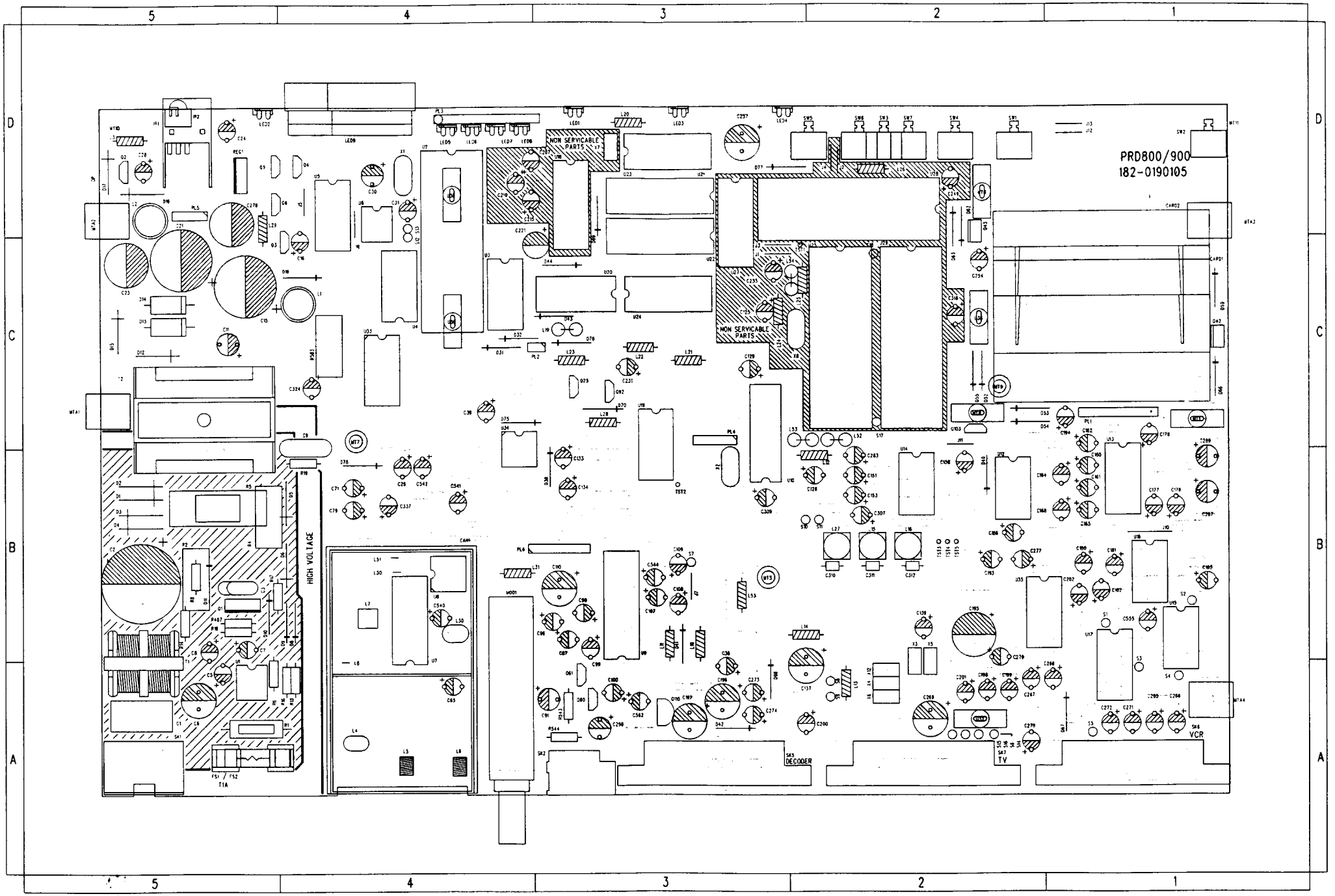
| | |
|---|---|
| U1 | A5 |
| U2 | D4 |
| U3 | C4 |
| U4 | C4 |
| U5 | D4 |
| U6 | D4 |
| U7 | B4 |
| U8 | B4 |
| U9 | B3 |
| U10 | C3 |
| U11 | B4† |
| U12 | B2 |
| U13 | B1 |
| U14 | B2 |
| U15 | B1 |
| U16 | B1 |
| U17 | B1 |
| U18 | D3 |
| U19 | C3 |
| U20 | C3 |
| U21 | D3 |
| U22 | C3 |
| U23 | D3 |
| U24 | C3 |
| U25 | C2 |
| U26 | C5† |
| U27 | D3 |
| U28 | D2 |
| U29 | C2 |
| U30 | D4† |
| U31 | C4† |
| U32 | C4† |
| U33** | C4 |
| U34** | C4 |
| U35 | B2 |

## MISC. COMPONENTS

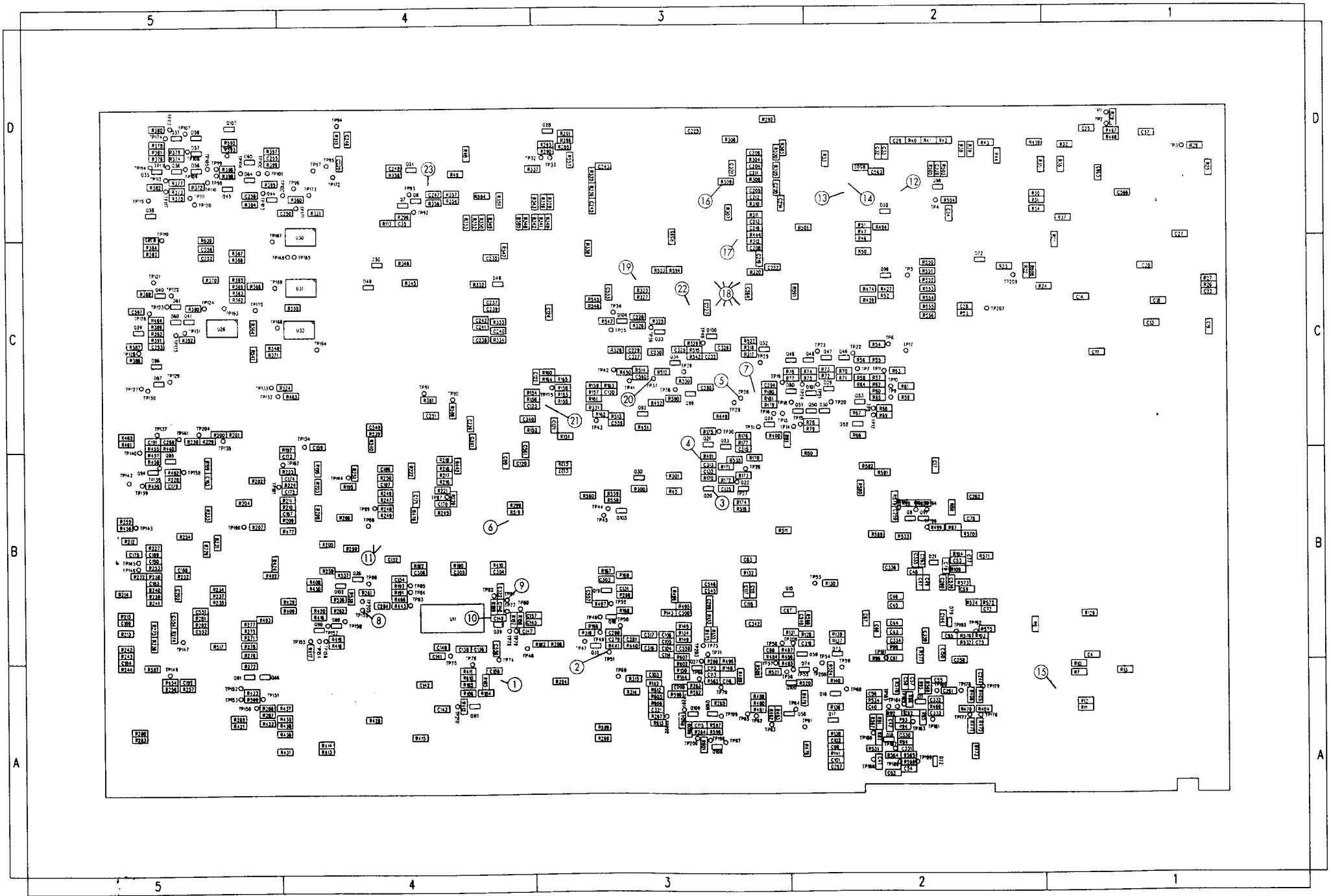
| | |
|---|---|
| CAN1 | B4 |
| CARD1 | C1 |
| FS1 | A5 |
| IR1 | D5 |
| IR2** | D5 |
| J1 | C3 |
| J2 | D2 |
| J3 | C3 |
| J4 | D2 |
| J5** | D4 |
| J6 | D4 |
| J7 | B3 |
| J10 | B1 |
| J11** | C2 |
| J12** | D1 |
| J13 | D1 |
| LED1** | D3 |
| LED2** | D5 |
| LED3** | D3 |
| LED4** | D3 |
| LED5** | D4 |
| LED6** | D4 |
| LED7** | D4 |
| LED8** | D4 |
| LED9 | D4 |
| MOD1 | B4 |
| MT1 | C1 |
| MT5 | B3 |
| MT6 | D2 |
| MT7 | C4 |
| MT8 | C2 |
| MT9 | C2 |
| MT10 | D5 |
| MT11 | D1 |
| MTA1 | C5 |
| MTA2 | D5 |
| MTA3 | D1 |
| MTA4 | A1 |
| REG1 | D5 |
| S1 | B1 |
| S2 | B1 |
| S3 | A1 |
| S4 | A1 |
| S5 | A1 |
| S6 | A2 |
| S7 | B3 |
| S8 | A2 |
| S9 | A2 |
| S10 | B2 |
| S11 | B2 |
| S12 | D4 |
| S13 | D4 |
| S14 | A2 |
| S15 | A2 |
| S16 | A2 |
| S17 | C2 |
| S18 | C2 |
| SW1** | D2 |
| SW2** | D1 |
| SW3** | D2 |
| SW4 | D2 |
| SW5 | D2 |
| SW6 | D2 |
| SW7 | D2 |
| T1 | B5 |
| T1A | A5 |
| T2 | C5 |
| TST1 | C2 |
| TST2 | B3 |
| TST3 | B2 |
| TST4 | B2 |
| TST5 | B2 |
| X1‡ | D4 |
| X2 | B3 |
| X3 | B2 |
| X4 | A2 |
| X5 | B2 |
| X6 | A2 |
| X7 | D3 |
| X8 | C2 |
| X12** | A2 |

** not fitted on either receiver
* not fitted on single input receiver
§ not fitted on dual input receiver
° actually a resistor (in a capacitor position)
† mounted on copper side of PCB
‡ may be mounted on µP sub-assembly board (NB: C32 as C5 and C33 as C6)

## MAIN PRINTED CIRCUIT BOARD - COMPONENT SIDE



## MAIN PRINTED CIRCUIT BOARD - COPPER SIDE (SURFACE MOUNT COMPONENTS)



# SPARES - PARTS LIST

## ELECTRICAL PARTS COMMON TO SINGLE AND DUAL INPUT RECEIVERS

### Capacitors

| | | |
|---|---|---|
| C1 | CLASS X CAP-100NF 250V 20% | 159-1048780 |
| C2 | 47UF400V 7.5/10MM RADIAL ELECT CAP | 155-4769780 |
| C3 | CER CAP 1NF 2KV 7.5MM 10% HR SERIES (TR) | 159-1029651 |
| C4 | SMD 1.2NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1225621 |
| C5 | 22UF16V 5MMRADIAL ELECT' CAPTR | 155-2261751 |
| C6 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C7 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C8 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C9 | "A" CLASS Y CAP-4N7 250V 20% | 159-4728781 |
| C10 | SMD 220NF 50V 20/80% CER Y5V CAP 0805 TR | 950-2245951 |
| C11 | 100UF 35V DJ3RADIAL ELECT' CAP | 855-1073951 |
| C13 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C14 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C15 | 2200UF 25V DJ3RADIAL ELECT' CAP | 855-2282960 |
| C16 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C17 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C18 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C19 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C20 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C21 | 2200UF 25V DJ3RADIAL ELECT' CAP | 855-2282960 |
| C22 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C23 | 1000UF 25V DJ3 RADIAL ELECT CAP 5MM TR | 855-1082951 |
| C24 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C25 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C26 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C28 | 1K50.25W 5% CARBON FILM RES TR | 140-1522501 |
| C29 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C30 | 220UF 16V 5MMRADIAL ELECT' CAPTR | 155-2271751 |
| C31 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C34 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C35 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C36 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C37 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C40 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C41 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C42 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C43 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C44 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C45 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C46 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C47 | SMD 1.5PF 50V +-0.25PF CER COG CAP 0805 | 950-0155301 |
| C48 | SMD 1.5PF 50V +-0.25PF CER COG CAP 0805 | 950-0155301 |
| C49 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C54 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C55 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C56 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C57 | SMD 22NF 50V 10% CER X7R CAP 0805 (TRS) | 950-2235621 |
| C58 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C59 | SMD 22NF 50V 10% CER X7R CAP 0805 (TRS) | 950-2235621 |
| C61 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C62 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C63 | SMD 27PF 50V 5% CER COG CAP 0805 (TRS) | 950-2705501 |
| C65 | 22UF 35V 5MM 20% MINI RAD ELEC' CAPTR | 156-2263751 |
| C66 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C67 | SMD 150PF 50V 5% CER COG CAP 0805 (TRS) | 950-1515501 |
| C70 | SMD 12PF 50V 5% CER COG CAP 0805 (TRS) | 950-1205501 |
| C71 | 10UF35V 2MMRADIAL ELECT' CAP | 155-1063720 |
| C72 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C77 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C78 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C79 | 1UF35V 5MMRADIAL ELECT' CAPTR | 155-1053751 |
| C83 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C86 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C87 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C90 | SMD 6K80.1W5% RES 0805 (TRS) | 940-6820501 |
| C91 | 100UF 50V 5MM 20% RAD ELEC CAP | 155-1075751 |
| C95 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C96 | 1UF35V 5MMRADIAL ELECT' CAPTR | 155-1053751 |
| C97 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C98 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C99 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C100 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C103 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C104 | SMD 33PF 50V 5% CER COG CAP 0805 (TRS) | 950-3305501 |
| C105 | SMD 150PF 50V 5% CER COG CAP 0805 (TRS) | 950-1515501 |
| C106 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C107 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C108 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C109 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C110 | 470UF 16V 5MMRADIAL ELECT' CAPTR | 155-4771751 |
| C111 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C112 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C114 | SMD 390PF 50V 5% CER COG CAP 0805 (TRS) | 950-3915501 |
| C115 | SMD 33PF 50V 5% CER COG CAP 0805 (TRS) | 950-3305501 |
| C116 | SMD 270PF 50V5% CER.CAP 0805 (TRS) | 950-2715501 |
| C117 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C119 | SMD 33PF 50V 5% CER COG CAP 0805 (TRS) | 950-3305501 |
| C120 | SMD 33PF 50V 5% CER COG CAP 0805 (TRS) | 950-3305501 |
| C121 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C122 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C123 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C124 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C125 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C126 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C127 | SMD 56PF 50V 5% CER COG CAP 0805 (TRS) | 950-5605501 |
| C128 | 2.2UF 16V 5MMRADIAL ELECT' CAPTR | 155-2251751 |
| C129 | 3.3UF 16V 5MMRADIAL ELECT' CAPTR | 155-3351751 |
| C130 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C131 | SMD 100PF 50V 5% CER COG CAP 0805 (TRS) | 950-1015501 |
| C132 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C133 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C134 | 100UF 16V 5MMRADIAL ELECT' CAPTR | 155-1071751 |
| C135 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C136 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C137 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C138 | SMD 22NF 50V 10% CER X7R CAP 0805 (TRS) | 950-2235621 |
| C139 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C140 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C141 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C144 | SMD 150PF 50V +-5% CER P2H CAP 0805 (TRS | 955-1515501 |
| C145 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C146 | SMD 390PF 50V 5% CER COG CAP 0805 (TRS) | 950-3915501 |
| C147 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C148 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C150 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C151 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C152 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C153 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C154 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C156 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C157 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C158 | 22UF 35V 5MM 20% MINI RAD ELEC' CAPTR | 156-2263751 |
| C159 | SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS | 950-4741951 |
| C160 | 2.2UF 16V 5MMRADIAL ELECT' CAPTR | 155-2251751 |
| C161 | 47UF16V 5MMRADIAL ELECT' CAPTR | 155-4761751 |
| C162 | 3.3UF 16V 5MMRADIAL ELECT' CAPTR | 155-3351751 |
| C163 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |

Service Manual

| | | |
|---|---|---|
| C164 | 2.2UF 16V 5MMRADIAL ELECT' CAPTR | 155-2251751 |
| C165 | 4.7UF 16V 5MMRADIAL ELECT' CAPTR | 155-4751751 |
| C166 | 47UF16V 5MMRADIAL ELECT' CAPTR | 155-4761751 |
| C167 | SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS) | 950-3325521 |
| C168 | 4.7UF 16V 5MMRADIAL ELECT' CAPTR | 155-4751751 |
| C169 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C170 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C171 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 50-4715621 |
| C172 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C174 | SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS) | 950-4725621 |
| C175 | SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS | 950-4741951 |
| C176 | 2.2UF 16V 5MMRADIAL ELECT' CAPTR | 155-2251751 |
| C177 | 47UF16V 5MMRADIAL ELECT' CAPTR | 155-4761751 |
| C178 | 3.3UF 16V 5MMRADIAL ELECT' CAPTR | 155-3351751 |
| C179 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C180 | 2.2UF 16V 5MMRADIAL ELECT' CAPTR | 155-2251751 |
| C181 | 4.7UF 16V 5MMRADIAL ELECT' CAPTR | 155-4751751 |
| C182 | 47UF16V 5MMRADIAL ELECT' CAPTR | 155-4761751 |
| C183 | SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS) | 950-3325521 |
| C184 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C185 | 4.7UF 16V 5MMRADIAL ELECT' CAPTR | 155-4751751 |
| C186 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C187 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 950-4715621 |
| C188 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C190 | SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS) | 950-4725621 |
| C192 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C193 | 100UF 16V 5MMRADIAL ELECT' CAPTR | 155-1071751 |
| C194 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C195 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C196 | 100UF 16V 5MMRADIAL ELECT' CAPTR | 155-1071751 |
| C197 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C198 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C199 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C200 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C201 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C202 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C203 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C204 | | 950-1015501 |
| C205 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C206 | SMD 1N5 50V 10% CER X7R CAP 0805 (TRS) | 950-1525621 |
| C207 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C208 | SMD 22NF 50V 10% CER X7R CAP 0805 (TRS) | 950-2235621 |
| C209 | SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS) | 950-4725621 |
| C210 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C211 | SMD 4.7NF 50V 10% CER X7R CAP 0805 (TRS) | 950-4725621 |
| C212 | SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS) | 950-3325521 |
| C213 | SMD 68NF 25V 10% CER X7R CAP 0805 (TRS) | 950-6832621 |
| C214 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C215 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C216 | SMD 3.3NF 50V 5% CER X7R CAP 0805 (TRS) | 950-3325521 |
| C219 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C220 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C221 | 220UF 16V 5MMRADIAL ELECT' CAPTR | 155-2271751 |
| C222 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C225 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C227 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C228 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C229 | SMD 39PF 50V 5% CER COG CAP 0805 (TRS) | 950-3905501 |
| C230 | SMD 100PF 50V 5% CER COG CAP 0805 (TRS) | 950-1015501 |
| C231 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C232 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C233 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C235 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C236 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C238 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 950-4715621 |
| C239 | SMD 100PF 50V 5% CER COG CAP 0805 (TRS) | 950-1015501 |
| C240 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C241 | SMD 47PF 50V 5% CER COG CAP 0805 (TRS) | 950-4705501 |
| C242 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C243 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C244 | SMD 4.7PF 50V +-0.25PF CER COG CAP 0805 | 950-0475301 |
| C245 | SMD 47PF 50V 5% CER COG CAP 0805 (TRS) | 950-4705501 |
| C246 | MD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C247 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C248 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C249 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C250 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C251 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C252 | SMD 68NF 25V 10% CER X7R CAP 0805 (TRS) | 950-6832621 |
| C253 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 950-4715621 |
| C254 | 1UF16V 5MMRADIAL ELECT' CAPTR | 155-1051751 |
| C255 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 950-4715621 |
| C256 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C257 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C258 | SMD 4.7PF 50V +-0.25PF CER COG CAP 0805 | 950-0475301 |
| C259 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C260 | SMD 1.5PF 50V +-0.25PF CER COG CAP 0805 | 950-0155301 |
| C261 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C262 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C263 | SMD 100PF 50V 5% CER COG CAP 0805 (TRS) | 950-1015501 |
| C265 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C266 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C267 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C268 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C269 | 1000UF 16V 5MM RAD ELEC' CAP (10X16) | 155-1081750 |
| C270 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C271 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C272 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C273 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C274 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C276 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C277 | 100UF 16V 5MMRADIAL ELECT' CAPTR | 155-1071751 |
| C278 | 2200UF 16V 5.0MM RADIAL ELECT' CAP | 155-2281770 |
| C280 | SMD 47PF 50V 5% CER COG CAP 0805 (TRS) | 950-4705501 |
| C286 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C288 | SMD 10NF 50V 10% CER X7R CAP 0805 (TRS) | 950-1035621 |
| C289 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C294 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C300 | SMD 47PF 50V 5% CER COG CAP 0805 (TRS) | 950-4705501 |
| C301 | | 950-1042951 |
| C305 | SMD 150PF 50V 5% CER COG CAP 0805 (TRS) | 950-1515501 |
| C306 | SMD 150PF 50V 5% CER COG CAP 0805 (TRS) | 950-1515501 |
| C307 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C309 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C313 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C318 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C319 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C320 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C321 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C322 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C324 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C325 | SMD 22PF 50V 5% CER COG CAP 0805 (TRS) | 950-2205501 |
| C326 | SMD 27PF 50V 5% CER COG CAP 0805 (TRS) | 950-2705501 |
| C327 | SMD 5.6PF 50V +-0.25PF CER COG CAP 0805 | 950-0565301 |
| C330 | SMD 12PF 50V 5% CER COG CAP 0805 (TRS) | 950-1205501 |
| C332 | SMD 12PF 50V 5% CER COG CAP 0805 (TRS) | 950-1205501 |
| C334 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C335 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C336 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C337 | 4.7UF 35V 5MMRADIAL ELECT' CAP TR | 155-4753751 |
| C339 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C340 | SMD 47PF 50V 5% CER COG CAP 0805 (TRS) | 950-4705501 |
| C342 | SMD 470PF 50V 10% CER X7R CAP 0805 (TRS) | 950-4715621 |
| C539 | SMD 1.5PF 50V +-0.25PF CER COG CAP 0805 | 950-0155301 |

| | | |
|---|---|---|
| C540 | 1UF 50V 5MM 20% MINI RAD ELEC' CAPTR | 156-1055751 |
| C541 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C542 | 22UF 35V 5MM 20% MINI RAD ELEC' CAPTR | 156-2263751 |
| C544 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C545 | SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS | 950-4741951 |
| C546 | SMD 470NF 16V 20/80 CER Y5V CAP 0805 TRS | 950-4741951 |
| C549 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C550 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |
| C551 | SMD 2.2NF 50V 5% CER COG CAP 0805 (TRS) | 950-2225501 |
| C552 | SMD 2.2NF 50V 5% CER COG CAP 0805 (TRS) | 950-2225501 |
| C553 | SMD 100PF 50V 5% CER COG CAP 0805 (TRS) | 950-1015501 |
| C554 | SMD 220PF 50V 5% CER COG CAP 0805 (TRS) | 950-2215501 |
| C555 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C556 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| C557 | SMD 270PF 50V5% CER.CAP 0805 (TRS) | 950-2715501 |
| C559 | SMD 270PF 50V5% CER.CAP 0805 (TRS) | 950-2715501 |
| C561 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| C562 | 10UF25V 5MMRADIAL ELECT' CAPTR | 155-1062751 |
| C563 | SMD 1NF 50V 5% CER COG CAP 0805 (TRS) | 950-1025501 |
| C565 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C566 | SMD 220NF 25V 20/80% CER Y5V CAP 0805 TR | 950-2242951 |
| C567 | SMD 330PF 50V 10% CER COG CAP 0805 (TRS) | 950-3315601 |

## Diodes

| | | |
|---|---|---|
| D1 | DIODE-1N4007TR | 120-0400701 |
| D2 | DIODE-1N4007TR | 120-0400701 |
| D3 | DIODE-1N4007TR | 120-0400701 |
| D4 | DIODE-1N4007TR | 120-0400701 |
| D5 | DIODE-BYV96D (PHILIPS)TR | 120-0009611 |
| D6 | DIODE-BYV96D (PHILIPS)TR | 120-0009611 |
| D8 | SIGNAL DIODE-1N4148 75MA 75VTR | 120-0414801 |
| D9 | SIGNAL DIODE-1N4148 75MA 75VTR | 120-0414801 |
| D10 | SIGNAL DIODE-1N4148 75MA 75VTR | 120-0414801 |
| D11 | 3V9 5% 400MW ZENER DIODETR | 125-0039501 |
| D12 | DIODE-BYV95A (PHILIPS)TR | 120-0009511 |
| D13 | DIODE-BYW98-50TR | 120-0009801 |
| D14 | DIODE-BYW98-50TR | 120-0009801 |
| D15 | DIODE-BYV95A (PHILIPS)TR | 120-0009511 |
| D16 | DIODE-1N4007TR | 120-0400701 |
| D17 | DIODE-1N4007TR | 120-0400701 |
| D20 | MD DIODE-BAS16 SOT-23 | 912-0001651 |
| D21 | SMD DIODE-BB515 MINI PLAST (TRS) | 912-0051501 |
| D22 | SMD DIODE-BAS19 SOT-23 (TRS) | 912-0001951 |
| D38 | SIGNAL DIODE-BAT43TR | 120-0004301 |
| D39 | SMD DIODE-BB619 MINI PLAST (TRS) | 912-0061901 |
| D40 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D41 | 4V7 2% 400MW ZENER DIODETR | 125-0047201 |
| D42 | 4V7 2% 400MW ZENER DIODETR | 125-0047201 |
| D43 | 4V3 2% 400MW ZENER DIODE TR | 125-0043201 |
| D44 | 2V4 2% 400MW ZENER DIODE TR | 125-0024201 |
| D49 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D50 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D51 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D52 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D53 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D54 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D55 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D56 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D57 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D58 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D59 | 6V8 2% 200MW ZENER DIODE TR | 125-0068201 |
| D60 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D61 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D62 | SIGNAL DIODE-BAT43TR | 120-0004301 |
| D63 | 5V6 2% 400MW ZENER DIODE TR | 125-0056201 |
| D64 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D65 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D66 | SIGNAL DIODE-BAT43TR | 120-0004301 |
| D67 | 4V7 2% 400MW ZENER DIODETR | 125-0047201 |
| D69 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D70 | SIGNAL DIODE-BAT43TR | 120-0004301 |
| D76 | 5V6 5% 400MW ZENER DIODE TR | 125-0056501 |
| D77 | 5V1 2% 400MW ZENER DIODE TR | 125-0051201 |
| D78 | 5V1 2% 400MW ZENER DIODE TR | 125-0051201 |
| D79 | SMD DIODE-BB619 MINI PLAST (TRS) | 912-0061901 |
| D96 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D97 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D98 | 4V7 2% 400MW ZENER DIODETR | 125-0047201 |
| D100 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |

## Inductors

| | | |
|---|---|---|
| L1 | INDUCTOR-1A 100UH (TDK TSL1110-101K1RO) | 131-1000500 |
| L2 | INDUCTOR-1A 100UH (TDK TSL1110-101K1RO) | 131-1000500 |
| L3 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L4 | BALUN-BC0403RID-B (PEDOKA) | 133-0040300 |
| L5 | 200NH-COIL(GOLD) AIR WOUND (PEDOKA) | 134-0200080 |
| L6 | 200NH-COIL(GOLD) AIR WOUND (PEDOKA) | 134-0200080 |
| L7 | SOUND COIL 4.77UH +-3% TOKO | 133-0047050 |
| L8 | 18NH-COIL (GOLD) AIR WOUND (PEDOKA) | 134-0018080 |
| L10 | AXIAL INDUCTOR-18UH 5% 0.5MMTR | 130-0180501 |
| L11 | AXIAL INDUCTOR-18UH 5% 0.5MMTR | 130-0180501 |
| L12 | 15UH 5% AXIAL INDUCTORTR | 130-0150501 |
| L14 | 2U2H 5% AXIAL INDUCTORTR | 130-0022501 |
| L15 | ADJ COIL 119LNS-4713HM (TOKO) | 133-1194713 |
| L16 | ADJ COIL 119LNS-4713HM (TOKO) | 133-1194713 |
| L19 | RAD FERR BEAD(PEDOKA BL02RN2-R62T2) TR | 133-0226201 |
| L20 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L21 | 15UH 5% AXIAL INDUCTORTR | 130-0150501 |
| L22 | AXIAL IND -12UH 5% SRF 19MHZ MINTR | 130-0120501 |
| L23 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L24 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L25 | AXIAL INDUCTOR-1UH5% TR | 130-0010501 |
| L26 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L28 | AXIAL INDUCTOR-33UH 5% TR | 130-0330501 |
| L29 | AXIAL INDUCTOR-150UH 10% DC RES<2.8R TR | 130-1500611 |
| L30 | 2U2H 5% AXIAL INDUCTORTR | 130-0022501 |
| L31 | AXIAL INDUCTOR-18UH 10% DC RES <0.8R TR | 130-0180611 |
| L50 | 18NH-COIL (GOLD) AIR WOUND (PEDOKA) | 134-0018080 |
| L51 | 15NH-COIL(GREEN) AIR WOUND (PEDOKA) | 134-0015090 |
| L52 | TINNED COPPER WIRE LINK | 999-1099901 |
| L53 | 100R 0.25W 5% CAR FILM RES TR | 140-1012501 |
| L54 | RAD FERR BEAD(PEDOKA BL02RN2-R62T2) TR | 133-0226201 |
| L55 | 2U2H 5% AXIAL INDUCTORTR | 130-0022501 |

## Transistors

| | | |
|---|---|---|
| Q1 | TRANSISTOR-BUT11A (PHILIPS) | 110-0001101 |
| Q2 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q3 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q4 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q5 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q6 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q7 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q8 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q9 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q10 | SMD TRANSISTOR-BFR193 (SIEMENS) SOT-23 | 911-0019351 |
| Q11 | SMD TRANSISTOR-BFR193 (SIEMENS) SOT-23 | 911-0019351 |
| Q15 | SMD TRANSISTOR-ZVN3306F SOT-23 | 911-0330651 |
| Q18 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q19 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q20 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q22 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q23 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q24 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q25 | TRANSISTOR-ZTX314 TO-92 PACK.(ZETEX) TR | 110-0031411 |
| Q26 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |

| | | |
|---|---|---|
| Q27 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q30 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q31 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q32 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q33 | SMD TRANSISTOR-FMMT2369A SOT-23 | 911-0236951 |
| Q34 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q35 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q36 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q37 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q38 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q39 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q40 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q41 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q42 | PWR TRANSISTOR-BD139 NPN TO-126 PAC.TR | 110-0013901 |
| Q43 | PWR TRANSISTOR-BD139 NPN TO-126 PAC.TR | 110-0013901 |
| Q44 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q45 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q66 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q89 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q90 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q91 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q92 | TRANSISTOR-ZVN3306A FET | 110-0330601 |
| Q93 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q96 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q97 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q98 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q99 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q100 | SMD TRANSISTOR-FMMT2369A SOT-23 | 911-0236951 |
| Q102 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q103 | TRANSISTOR-ZTX314 TO-92 PACK.(ZETEX) TR | 110-0031411 |
| Q104 | SMD TRANSISTOR-FMMT2369A SOT-23 | 911-0236951 |
| Q105 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q106 | SMD TRANSISTOR-FMMT2369A SOT-23 | 911-0236951 |
| Q108 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q109 | SMD TRANSISTOR-FMMT2369A SOT-23 | 911-0236951 |
| Q110 | TRANSISTOR-BC547B NPN TO-92 PACKAGE TR | 110-1054701 |
| Q111 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |

## Resistors

| | | |
|---|---|---|
| R1 | 4R7 3W 5% AXIAL W/W RES WA84 TYPE | 143-0476511 |
| R2 | 100K 2W5% METAL FILM RES TR | 142-1046511 |
| R4 | 2K2 2W5% METAL FILM RES TR | 142-2226511 |
| R5 | 1K 5W 10% AX/PLUG CER CASE RES KWP332 | 145-1029600 |
| R6 | 15R0.25W 5% CARBON FILM RESTR | 140-1502501 |
| R7 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R8 | *A* 0R75 0.5W 5% NON-FLAMMABLE RESTR | 148-0075551 |
| R9 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R10 | SMD 1K0.1W1% RES 0805 (TRS) | 940-1020101 |
| R11 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R12 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R13 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R14 | *A* 100R 0.25W 5% NON-FLAMMABLE RESTR | 148-1012551 |
| R15 | 68R0.25W 5% CARBON FILM RESTR | 140-6802501 |
| R16 | 68R0.25W 5% CARBON FILM RESTR | 140-6802501 |
| R17 | 4R70.25W 5% CARBON FILM RESTR | 140-0472501 |
| R18 | 470R 0.25W 1% METAL FILM RES | 141-4712101 |
| R19 | *A* 4M7 0.5W VR37 METAL FILM RESTR | 142-4755511 |
| R21 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R22 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R23 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R25 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R26 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R27 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R28 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R29 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R30 | SMD 680R 0.1W5% RES 0805 (TRS) | 940-6810501 |
| R31 | SMD 680R 0.1W5% RES 0805 (TRS) | 940-6810501 |
| R34 | SMD 680R 0.1W5% RES 0805 (TRS) | 940-6810501 |
| R35 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R36 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R37 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R38 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R39 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R40 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R41 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R42 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R43 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R44 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R45 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R46 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R47 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R48 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R49 | SMD 6K80.1W5% RES 0805 (TRS) | 940-6820501 |
| R50 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R51 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R52 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R82 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R84 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R85 | SMD 150R 0.1W5% RES 0805 (TRS) | 940-1510501 |
| R86 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R87 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R88 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R89 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R91 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R92 | SMD 22R0.1W5% RES 0805 (TRS) | 940-2200501 |
| R93 | SMD 22R0.1W5% RES 0805 (TRS) | 940-2200501 |
| R94 | SMD 120R 0.1W5% RES 0805 (TRS) | 940-1210501 |
| R95 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R96 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R98 | SMD 8K20.1W5% RES 0805 (TRS) | 940-8220501 |
| R103 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R104 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R109 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R113 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R128 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R129 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R130 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R131 | SMD 5K60.1W1% RES 0805 (TRS) | 940-5620101 |
| R132 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R133 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R134 | SMD 1K0.1W1% RES 0805 (TRS) | 940-1020101 |
| R135 | SMD 3K9 0.1W 1% RES 0805 (TRS) | 940-3920101 |
| R142 | SMD 360R 0.1W5% RES 0805 (TRS) | 940-3610501 |
| R143 | SMD 360R 0.1W5% RES 0805 (TRS) | 940-3610501 |
| R144 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R145 | SMD 1K0.1W1% RES 0805 (TRS) | 940-1020101 |
| R148 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R149 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R150 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R151 | SMD 4K70.1W1% RES 0805 (TRS) | 940-4720101 |
| R152 | SMD 910R 0.1W1% RES 0805 (TRS) | 940-9110101 |
| R153 | SMD 3K30.1W1% RES 0805 (TRS) | 940-3320101 |
| R154 | SMD 1K0.1W1% RES 0805 (TRS) | 940-1020101 |
| R155 | SMD 3K60.1W1% RES 0805 (TRS) | 940-3620101 |
| R156 | SMD 910R 0.1W1% RES 0805 (TRS) | 940-9110101 |
| R157 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R158 | SMD 3K60.1W1% RES 0805 (TRS) | 940-3620101 |
| R159 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R160 | SMD 910R 0.1W1% RES 0805 (TRS) | 940-9110101 |
| R161 | SMD 8K20.1W5% RES 0805 (TRS) | 940-8220501 |
| R163 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R164 | SMD 3K9 0.1W 1% RES 0805 (TRS) | 940-3920101 |
| R165 | SMD 1K5 0.1W1% RES 0805 (TRS) | 940-1520101 |
| R166 | SMD 150R 0.1W5% RES 0805 (TRS) | 940-1510501 |

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|---|---|---|
| R167 | SMD 150R 0.1W5% RES 0805 (TRS) | 940-1510501 |
| R168 | SMD 120R 0.1W5% RES 0805 (TRS) | 940-1210501 |
| R169 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R170 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R171 | SMD 680R 0.1W1% RES 0805 (TRS) | 940-6810101 |
| R172 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R173 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R174 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R175 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R176 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R177 | SMD 360R 0.1W5% RES 0805 (TRS) | 940-3610501 |
| R178 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R179 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R180 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R181 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R182 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R184 | SMD 680R 0.1W5% RES 0805 (TRS) | 940-6810501 |
| R185 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R186 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R187 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R188 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R189 | SMD 15K0.1W5% RES 0805 (TRS) | 940-1530501 |
| R190 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R191 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R192 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R193 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R195 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R197 | SMD 68K0.1W5% RES 0805 (TRS) | 940-6830501 |
| R198 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R199 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R200 | SMD 10M0.1W 10% RES 0805 (TRS) | 940-1060601 |
| R201 | SMD 4M70.1W 10% RES 0805 (TRS) | 940-4750601 |
| R202 | SMD 82K0.1W5% RES 0805 (TRS) | 940-8230501 |
| R203 | SMD 39K0.1W5% RES 0805 (TRS) | 940-3930501 |
| R204 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R205 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R206 | SMD 39K0.1W5% RES 0805 (TRS) | 940-3930501 |
| R207 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R208 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R209 | SMD 4M70.1W 10% RES 0805 (TRS) | 940-4750601 |
| R210 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R211 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R212 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R213 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R214 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R215 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R216 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R217 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R218 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R219 | SMD 33K0.1W5% RES 0805 (TRS) | 940-3330501 |
| R220 | SMD 3K30.1W1% RES 0805 (TRS) | 940-3320101 |
| R221 | SMD 6K80.1W5% RES 0805 (TRS) | 940-6820501 |
| R222 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R223 | SMD 3K9 0.1W 1% RES 0805 (TRS) | 940-3920101 |
| R226 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R227 | SMD 68K0.1W5% RES 0805 (TRS) | 940-6830501 |
| R228 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R229 | SMD 10M0.1W 10% RES 0805 (TRS) | 940-1060601 |
| R230 | SMD 4M70.1W 10% RES 0805 (TRS) | 940-4750601 |
| R231 | SMD 82K0.1W5% RES 0805 (TRS) | 940-8230501 |
| R232 | SMD 39K0.1W5% RES 0805 (TRS) | 940-3930501 |
| R233 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R234 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R235 | SMD 39K0.1W5% RES 0805 (TRS) | 940-3930501 |
| R236 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R237 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R238 | SMD 4M70.1W 10% RES 0805 (TRS) | 940-4750601 |
| R239 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R240 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R241 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R242 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R243 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R244 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R245 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R246 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R247 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R248 | SMD 33K0.1W5% RES 0805 (TRS) | 940-3330501 |
| R249 | SMD 3K30.1W1% RES 0805 (TRS) | 940-3320101 |
| R250 | SMD 6K80.1W5% RES 0805 (TRS) | 940-6820501 |
| R251 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R252 | SMD 3K9 0.1W 1% RES 0805 (TRS) | 940-3920101 |
| R254 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R255 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R256 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R257 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R258 | SMD 33K0.1W5% RES 0805 (TRS) | 940-3330501 |
| R259 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R261 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R262 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R263 | SMD 39K0.1W5% RES 0805 (TRS) | 940-3930501 |
| R264 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R265 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R266 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R267 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R268 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R269 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R271 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R272 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R273 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R274 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R275 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R276 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R277 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R278 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R280 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R281 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R282 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R283 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R285 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R286 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R287 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R288 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R294 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R296 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R298 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R299 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R300 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R301 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R303 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R304 | SMD 470K 0.1W5% RES 0805 (TRS) | 940-4740501 |
| R305 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R306 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R307 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R308 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| R309 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| R310 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| R311 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R312 | SMD 3K30.1W1% RES 0805 (TRS) | 940-3320101 |
| R314 | SMD 15K0.1W5% RES 0805 (TRS) | 940-1530501 |
| R315 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R316 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R317 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R318 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R320 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |

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| R321 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R323 | SMD 910R 0.1W1% RES 0805 (TRS) | 940-9110101 |
| R324 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R325 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R326 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R327 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R328 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R329 | SMD 680R 0.1W1% RES 0805 (TRS) | 940-6810101 |
| R330 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R331 | SMD 1K5 0.1W1% RES 0805 (TRS) | 940-1520101 |
| R333 | SMD 1M0.1W5% RES 0805 (TRS) | 940-1050501 |
| R334 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R335 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R336 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R337 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R338 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R339 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R340 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R341 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R342 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R343 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R345 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R346 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R347 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R348 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R349 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R350 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R351 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R352 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R353 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R354 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R355 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R356 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R357 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R358 | SMD 15K0.1W5% RES 0805 (TRS) | 940-1530501 |
| R359 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R360 | SMD 100R 0.1W 5% RES | 940-1010501 |
| R361 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R362 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R363 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R364 | SMD 1K5 0.1W1% RES 0805 (TRS) | 940-1520101 |
| R365 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R366 | SMD 1K5 0.1W1% RES 0805 (TRS) | 940-1520101 |
| R367 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R368 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R369 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R370 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R371 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R372 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R373 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R374 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R375 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R376 | SMD 130R 0.1W1% RES 0805 (TRS) | 940-1310101 |
| R377 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R378 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R379 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R380 | SMD 1K10.1W1% RES 0805 (TRS) | 940-1120101 |
| R381 | SMD 7K32 0.1W1% RES 0805 (TRS) | 940-7320191 |
| R382 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R383 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R385 | SMD 120R 0.1W5% RES 0805 (TRS) | 940-1210501 |
| R386 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R387 | SMD 4K70.1W1% RES 0805 (TRS) | 940-4720101 |
| R388 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R389 | SMD 5R60.1W5% RES 0805 (TRS) | 940-0560501 |
| R390 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R391 | SMD 15K0.1W5% RES 0805 (TRS) | 940-1530501 |
| R392 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R393 | SMD 15K0.1W5% RES 0805 (TRS) | 940-1530501 |
| R394 | SMD 3R9 0.1W5% RES 0805 (TRS) | 940-0390501 |
| R395 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R396 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R397 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R398 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R399 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R400 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R404 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R405 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R406 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R407 | 470R 0.25W 1% METAL FILM RES | 141-4712101 |
| R412 | SMD 680R 0.1W5% RES 0805 (TRS) | 940-6810501 |
| R413 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R414 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R415 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R416 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R417 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R418 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R419 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R420 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R421 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R422 | SMD 47K0.1W5% RES 0805 (TRS) | 940-4730501 |
| R423 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R424 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R426 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R427 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R428 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R429 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R430 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R431 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R435 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R436 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R437 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R438 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R440 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R441 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R444 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R449 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R450 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R451 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R452 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R454 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R456 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R458 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R459 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R464 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R465 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R467 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R468 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R469 | SMD 33R0.1W5% RES 0805 (TRS) | 940-3300501 |
| R471 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R472 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R473 | SMD 22R0.1W5% RES 0805 (TRS) | 940-2200501 |
| R475 | SMD 100K 0.1W5% RES 0805 (TRS) | 940-1040501 |
| R492 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R493 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R494 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R495 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R497 | SMD 47R0.1W5% RES 0805 (TRS) | 940-4700501 |
| R499 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R500 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| R501 | SMD 5K60.1W1% RES 0805 (TRS) | 940-5620101 |
| R502 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R503 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R504 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |

| | | |
|---|---|---|
| R505 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R509 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R512 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R513 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R514 | SMD 390R 0.1W5% RES 0805 (TRS) | 940-3910501 |
| R515 | SMD 3K30.1W1% RES 0805 (TRS) | 940-3320101 |
| R516 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R517 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R519 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R520 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R521 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R522 | SMD 120R 0.1W5% RES 0805 (TRS) | 940-1210501 |
| R523 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R530 | SMD 1K5 0.1W1% RES 0805 (TRS) | 940-1520101 |
| R531 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R532 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R533 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R534 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R535 | SMD 47R0.1W5% RES 0805 (TRS) | 940-4700501 |
| R536 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R537 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R538 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R539 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R540 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R541 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R542 | SMD 3K60.1W1% RES 0805 (TRS) | 940-3620101 |
| R543 | 1R00.25W 5% CARBON FILM RES | 140-0102501 |
| R544 | 1R00.25W 5% CARBON FILM RES | 140-0102501 |
| R545 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R546 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R547 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R548 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R557 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R558 | SMD 75R0.1W5% RES 0805 (TRS) | 940-7500501 |
| R559 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R560 | SMD 2K20.1W5% RES 0805 (TRS) | 940-2220501 |
| R562 | SMD 560R 0.1W5% RES 0805 (TRS) | 940-5610501 |
| R563 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R564 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R565 | SMD 220R 0.1W5% RES 0805 (TRS) | 940-2210501 |
| R566 | SMD 12R0.1W5% RES 0805 (TRS) | 940-1200501 |
| R567 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R568 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R569 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R570 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R571 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R572 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R573 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R574 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R575 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R576 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R577 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R578 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R579 | SMD 2K0.1W1% RES 0805 (TRS) | 940-2020101 |
| R580 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R581 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R582 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R583 | 68R 2W5% METAL FILM RES TR | 142-6806511 |
| R584 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R585 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R586 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R587 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R588 | SMD 220K 0.1W5% RES 0805 (TRS) | 940-2240501 |
| R590 | SMD 1K1 0.1W 1% RES 0805 (TRS) | 940-1120101 |
| R591 | SMD 47R0.1W5% RES 0805 (TRS) | 940-4700501 |
| R594 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R595 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |
| R596 | SMD 120R 0.1W5% RES 0805 (TRS) | 940-1210501 |
| R597 | SMD 150R 0.1W5% RES 0805 (TRS) | 940-1510501 |
| R598 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R599 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R600 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R601 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R602 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R603 | SMD 330R 0.1W5% RES 0805 (TRS) | 940-3310501 |
| R604 | SMD 100R 0.1W5% RES 0805 (TRS) | 940-1010501 |
| R605 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R606 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R607 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R609 | SMD 2K70.1W5% RES 0805 (TRS) | 940-2720501 |
| R610 | SMD 470R 0.1W5% RES 0805 (TRS) | 940-4710501 |
| R612 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |
| R613 | SMD 1K20.1W5% RES 0805 (TRS) | 940-1220501 |

## Connectors

| | | |
|---|---|---|
| SK1 | *A* LEONHARDY 07-78.2300 MAINS INPUT SKT | 875-0778231 |
| SK2 | PHONO SOCKET-DUAL (JALCO YKC21-0061) | 165-2000201 |
| SK5 | SCART SOCKET-MKF6341 (NO LUGS) | 163-2102112 |
| SK6 | SCART SOCKET-MKF6341 (NO LUGS) | 163-2102112 |
| SK7 | SCART SOCKET-MKF6341 (NO LUGS) | 163-2102112 |

## Integrated Circuits

| | | |
|---|---|---|
| U1 | TEA2018 SWITCH MODE PSU (THOMSON) | 109-0201801 |
| U3 | ULN2003 TRANSISTOR DARLINGTONS | 100-0200300 |
| U5 | 74LS139 DUAL 2 TO 4 LINE DECODER | 101-0013900 |
| U7 | SL5066 VIDEO MODULATOR (PLESSEY) | 109-0506601 |
| U8 | SP4633 SO PRESCALER (PLESSEY) | 109-0463301 |
| U9 | NICKY MICRO 24 PIN DIP VER 2FS | 109-0960101 |
| U10 | M50555 001P DISPLAY CONT (MISUBISHI) | 109-0505551 |
| U11 | TDA6160 SAT SOUND IF (SIEMENS) | 909-0616001 |
| U12 | LM324 QUAD OP AMP | 100-0032400 |
| U13 | NE572 PROG. ANALOG COMPANDOR (PHILIPS) | 100-0057201 |
| U14 | TL084 QUAD BI-FET OP AMP LOW NOISE | 100-0008400 |
| U15 | TL084 QUAD BI-FET OP AMP LOW NOISE | 100-0008400 |
| U16 | LM324 QUAD OP AMP | 100-0032400 |
| U17 | 4052 | 106-0405200 |
| U18 | TEA2130 SYNC SEP(DS173019) (THOMSON) | 109-0213001 |
| U19 | HEF4053 TRIPLE 2-CHANNEL MULTIPLEXER | 106-0405301 |
| U20 | SP973T8 8 BIT ADC (PLESSEY) | 109-0973800 |
| U21 | UPD41101C-1/2/3 (NEC) | 109-0411001 |
| U22 | UPD41101C-1/2/3 (NEC) | 109-0411001 |
| U23 | SN74ALS541N OCTAL BUFFER/LINE DR/RX (TI) | 101-1054101 |
| U24 | MV95308 8 BIT DAC (PLESSEY) | 109-9530801 |
| U25 | | 109-0160301 |
| U26 | SMD IC-74LS04 | 901-1000400 |
| U27 | | 109-0504501 |
| U28 | | 109-0680501 |
| U29 | | 109-0805201 |
| U30 | SMD IC-74LS74 | 901-1007401 |
| U31 | SMD IC-74LS74 | 901-1007401 |
| U32 | SMD IC-74LS03 | 901-1000301 |
| U35 | HEF4053 TRIPLE 2-CHANNEL MULTIPLEXER | 106-0405301 |

## Miscellaneous Components

| | | |
|---|---|---|
| CAN 1 | MODULATOR SCREENING CAN-FRAME REV 2 | 315-0235101 |
| | SILICONE RUBBER ADHESIVE | 206-0374400 |
| | FS1 FUSECLIP-PFC5000-0202 (SMK) | 201-7500001 |
| | REG HEATSINK-TO220C PUSH-ON | 202-0022000 |
| FS1 | *A* FUSE 1A 20 X 5MM GLASS ANTI-SURGE | 201-2511000 |
| J1-J13 | TINNED COPPER WIRE LINKS 0.61MM DIA.(TRS | 999-1099901 |
| REG 1 | V/REGULATOR-LM7812+12V 1.5A TO-220 | 105-0781200 |
| T1 | MAINS FILTER-(UF2327S-253-YOR5) "TDK" | 232-2327000 |
| T2 | *A* TRANSFORMER-SM MANBY 800 SERIES | 237-0400002 |
| TST1-5 | TEST PIN | 161-1000100 |
| X2 | XTAL 17.734MHZ HC18U 20/30/10 30PF PAR | 170-0177340 |

| | | |
|---|---|---|
| X3 | FILTER-SFE 10.52MJA 10K-A(MURATA) | 173-0105203 |
| X4 | FILTER-SFE 10.52MJA 10K-A(MURATA) | 173-0105203 |
| X5 | FILTER-SFE 10.7MJA 10K-A(MURATA) | 173-0107003 |
| X6 | FILTER-SFE 10.7MJA 10K-A(MURATA) | 173-0107003 |
| X7 | RESONATOR-503KHZ TYPE CSB503F21 | 171-0005030 |
| X8 | XTAL 28MHZ HC18U 50/100/-20/30PF PAR 3RD | 170-0280000 |

## ELECTRICAL PARTS UNIQUE TO SINGLE INPUT RECEIVER

| | | |
|---|---|---|
| R589 | SMD 0.1W5% ZEROHM LINK-0805 (TRS) | 940-0000501 |

## ELECTRICAL PARTS UNIQUE TO DUAL INPUT RECEIVER

| | | |
|---|---|---|
| C101 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C102 | SMD 0.1UF 25V 20/80% CER Y5V CAP 0805 TR | 950-1042951 |
| C297 | SMD 6K80.1W5% RES 0805 (TRS) | 940-6820501 |
| C298 | 100UF 25V 5MMRADIAL ELECT' CAPTR | 155-1072751 |
| D72 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D73 | SMD DIODE-BAS16 SOT-23 | 912-0001651 |
| D74 | SMD DIODE-BAR43 SOT-23 (TRS) | 912-0004351 |
| Q16 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q17 | SMD TRANSISTOR-BC856B SOT-23 | 911-1085651 |
| Q58 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q59 | SMD TRANSISTOR-BC846B SOT-23 | 911-1084651 |
| Q60 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| Q61 | TRANSISTOR-FTX749 (ZETEX)TR | 110-0074911 |
| R136 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R137 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R138 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R139 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R140 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R141 | SMD 1K0.1W5% RES 0805 (TRS) | 940-1020501 |
| R478 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R479 | SMD 22K0.1W5% RES 0805 (TRS) | 940-2230501 |
| R480 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R481 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R482 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R483 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R484 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R485 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R486 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R487 | SMD 270R 0.1W5% RES 0805 (TRS) | 940-2710501 |
| R488 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R489 | SMD 10K0.1W5% RES-0805 (TRS) | 940-1030501 |
| R550 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |
| R552 | SMD 4K70.1W5% RES 0805 (TRS) | 940-4720501 |

## PARTS FOR µP SUB-ASSEMBLY BOARD

| | | |
|---|---|---|
| C3 | 100NF 50V 5MM M/LAYER CER.CAP TR | 157-1045751 |
| C4 | 100NF 50V 5MM M/LAYER CER.CAP TR | 157-1045751 |
| C5 | 33PF 16V 5MMCERAMIC CAP 10% TR | 150-3301651 |
| C6 | 33PF 16V 5MMCERAMIC CAP 10% TR | 150-3301651 |
| | INS.WASHER-FOR HC18/49 (HOLED) X1 CAN | 208-0153000 |
| PL 1 | PIN HEADER-20 WAY EXT'D S/ROW(HARWIN) | 161-1002001 |
| | REV A1 PCB-OTP 800 SERIES REV A1 | 182-0185101 |
| U1 | SMD IC-Z86C9620VSC ROMLESS Z8 | 904-0869601 |
| U3 | 74LS374 OCTAL D TYPE LATCH | 101-0037400 |
| U4 | EPROM-27256 PACE PRD ONLY(VER 2) | 805-0800102 |
| X1 | CRYSTAL-4MHZ HC18U 50/50/-10+60 30PF PAR | 170-0040000 |

## MECHANICAL PARTS COMMON TO SINGLE AND DUAL INPUT RECEIVERS

| | | |
|---|---|---|
| 1 OFF | PAPER WIRE TIE 4" | 206-0040000 |
| 4 OFF | BUMPON-SJ5003 SMALL BLACK DOME | 208-5003010 |
| 2 OFF | BATTERY-AA | 239-0015010 |
| 6 OFF | SCREW M3x8 P/P TAP.C/W WASHER BLK SEAL | 246-3080011 |
| 3 OFF | SNAP RIVET-SR3555B BLACK PLASTIC RICHCO | 247-3555111 |
| 1 OFF | BAG-POLYTHENE FOR LEADS | 400-1080400 |
| 1 OFF | BAG-POLYTHENE FOR MKII SAT.REC. | 400-1141700 |

# LATE CHANGES

## Changes to Circuit Diagram C

As Circuit Diagram C is printed using special techniques, it went to print before the rest of this manual. The following changes are therefore included in the parts lists in the manual but are not shown on Circuit Diagram C:

- R590 is part of a potential divider used to set the black level on the VideoCrypt graphics. Because this level produced graphics on the grey side, the value of R590 was changed from 1.1 kΩ to 1.2 kΩ (ECO 000368). When, however, ECO S000014 (see below) was implemented, the DC level out of the DAC was affected, causing the black level to go into the sync and thereby causing the VideoCrypt graphics to break up. To solve this problem, R590 was changed back to its original value of 1.1 kΩ (ECO S000026).
- R591 was 22 Ω, but is now 47 Ω, R513 was 360 Ω, but is now 330 Ω and R331 was 1.2 kΩ, but is now 1.5 kΩ 1% (ECO 000368).
- C249 was 2.2 µF 16 V, but is now 10 µF 25 V (ECO 000376).
- C228 was changed from 100 nF to 1 nF and a 1 MΩ, 0.25 W resistor was retrofitted between the +5 V rail and pin 11 of U24 (ECO S000014). This is to cure latchup of the band gap reference in the DAC. The symptoms of this are that, on a VideoCrypt programme, the screen goes black but the VideoCrypt graphics can still be seen and the voltage on pin 11 of U24 is not 1 V.

ECO S000040 details the incorporation (into Revision B1 of the PCB) of two components which will replace the retrofitted 1 MΩ resistor mentioned above and the retrofitted 82 µH inductor shown on Circuit Diagram A. These components are:

- R611 (SMD 1M 0.1W 5% Resistor - Part no. 940-1050501);
- L56 (Axial Inductor - 82 µH 5% - Part no. 130-0820501.

Two ECOs were implemented to improve the performance of the receiver, especially to overcome sparklies:

- C564 is now not fitted (ECO S000010);
- L53 was an RF bead, but is now a 100 Ω 0.25 W resistor
  and L52 was an RF bead, but is now a wire link
  and C340 was 22 pF, but is now 47 pF
  and C250 was not fitted, but is now fitted and is 22 pF
  and R360 was 0 Ω, but is now 100 Ω (all ECO S000026).

## Removal of an Earth Loop

It has been discovered that the presence of an earth connection at the LNB connector and a separate earth connection at taptite screw F (see Figure 3 in the section entitled Gaining Access to the Unit) could lead to an earth loop. Such an earth loop can cause thin diagonal lines to appear on the picture, these being mainly noticeable when the receiver is connected using the UHF output (TV connector). A cut has therefore been made in the copper track leading to screw F in order to isolate this point (ECO S000022). Revision B1 of the PCB does not require this cut.

## Replacement of Microprocessor Sub-assembly Board by U2

As of 21.11.92, ECOs 0000308, S000030 and S000035 should come into effect. These detail the substitution of the microprocessor sub-assembly board by the dedicated microprocessor U2 (8661 Proc PRD Ser - Part no. 809-8661001). At the same time, crystal X1 will need to move back onto the main PCB, and the following capacitors re-fitted:

- C32 (SMD 33 pF 50V 5% Cer Cog Cap - Part no. 950-3305501);
- C33 (SMD 22 pF 50V 5% Cer Cog Cap - Part no. 950-2205501).

Also, on single input receivers, the IC U6 will need to change to Cat 24C08 8k-Bit serial EEPROM - Part no. 104-0240802.

As of 31.12.92, ECO 000408 should come into effect. This details the change of IC U2 to the following: 8661 Proc PRD Ser - Part no. 809-8661004.

## Component Ident Errors

Electrolytic capacitors C166, C182 and C276 have their component ident on the PCB reversed. To take account of this error, each needs to be mounted so that its negative leg (indicated by a black stripe on the capacitor body) is fitted into the hole marked by +, although there are no serious problems if they are left incorrect (ECO S000033 - note that it only applies to board revisions A3 and A5). ECO S000040 details the changes required to the idents to correct the problem for the Revision B1 PCB.

## Other Changes

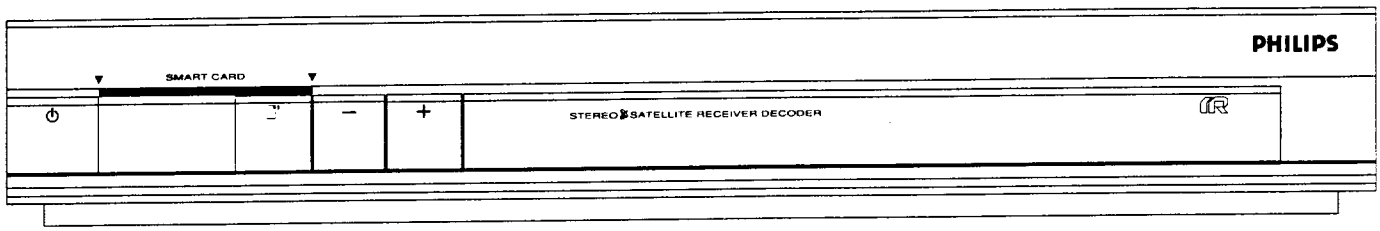
- As of 25.09.92, C10 will become an SMD 47 nF 50 V 10% Cer X7R Cap 0805 - Part no. 950-4735621 because of supply difficulties with the original part (PCO S000003).
- As of 10.11.92, video processing IC U9 will change from Version 2FS to Version 2 (Part no. 109-0960102) as detailed in ECO 000396.
- As of 9.10.92, R583 will become a 82 Ω 3 W 5% M/Film Res (FA85) - Part no. 142-8207511 in order to reduce its operating temperature (ECO 000416).
- As of 16.10.92, the lid of the modulator can will contain a 5.5 mm hole so that the sound coil L7 in the modulator can be adjusted after the lid has been fitted (ECO S000011).
- As of 6.11.92, adjustable coils L15 and L16 will become 10.7 MHz ±3% Adj coil type FH-7 - Part no. 133-2868704; as these include a capacitor, C305 and C306 will no longer be fitted (PCO S000002).

## SPECIAL FEATURES OF THE PHILIPS STU802/05M *(NOTE: This is a single input receiver.)*

The Philips STU802/05M receiver has a slightly different front panel from that described in the main pages of this manual. The ▲ button is replaced by +, the ▼ button by — and the authorise button by □.

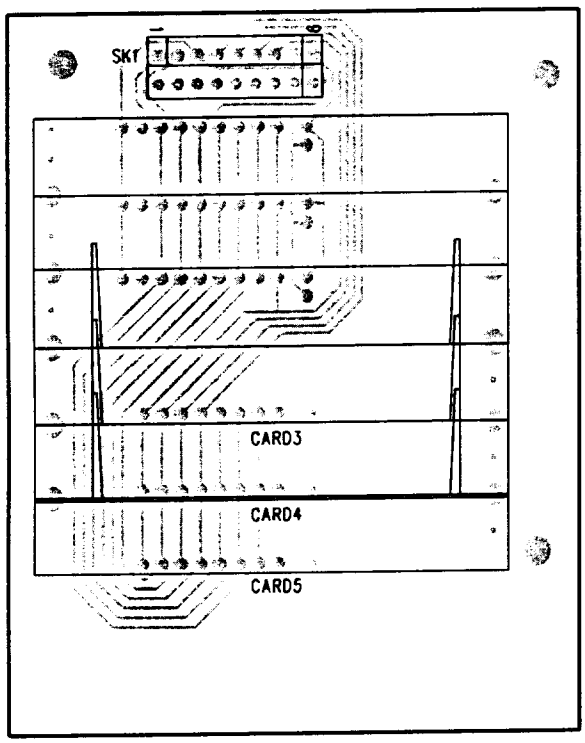
These front panel buttons are associated with different switch positions on the main PCB namely SW2, SW1, SW4 and SW3, rather than SW4, SW7, SW6 and SW5.

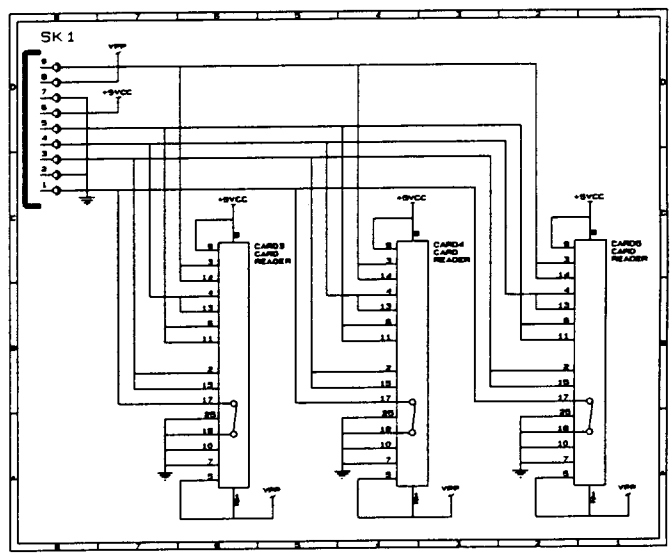
As the card slot is positioned higher on the front panel, the unit contains an off-the-board card reader which is described below.




## OFF-THE-BOARD CARD READER

The small PCB which contains the off-the-board card reader, its circuit diagram and parts list are shown below. The card reader is at position CARD5. The main PCB does not have a card reader assembled on it.




## ELECTRICAL PARTS UNIQUE TO STU802/05M

| | | |
|---|---|---|
| | U2 SOCKET 20 WAY TOP ENTRY (HARWIN) | 161-2002001 |
| LED 9 | 3-UNIT 7-SEG DISPLAY RED (PHILIPS) | 200-7030103 |
| IR1 | SONY INFRA-RED RECEIVER MODULE | 215-1620002 |
| MOD1 | BSFC75G00 SGL INPUT F'TUNER (SHARP 22CC) | 221-2075001 |
| SW1 | SWITCH-B3F3152 PCB SUBMIN 150GM (YELL) | 204-0315211 |
| SW2 | SWITCH-B3F3152 PCB SUBMIN 150GM (YELL) | 204-0315211 |
| SW3 | SWITCH-B3F3152 PCB SUBMIN 150GM (YELL) | 204-0315211 |
| SW4 | SWITCH-B3F3152 PCB SUBMIN 150GM (YELL) | 204-0315211 |
| U4 | ULN2003 TRANSISTOR DARLINGTONS | 100-0200300 |
| U6 | 24C08 8K EE (EXEL) | 104-0240801 |
| PL1 | HEADER- 9 WAY EXTENDED MOLEX | 161-1010921 |
| J12 | TINNED COPPER WIRE LINKS 0.61MM DIA.(TRS) | 999-1099901 |

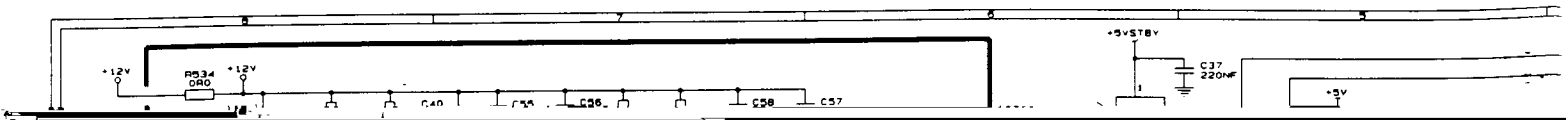
NOTE: Because J12 is fitted on this receiver, J13 is not fitted.

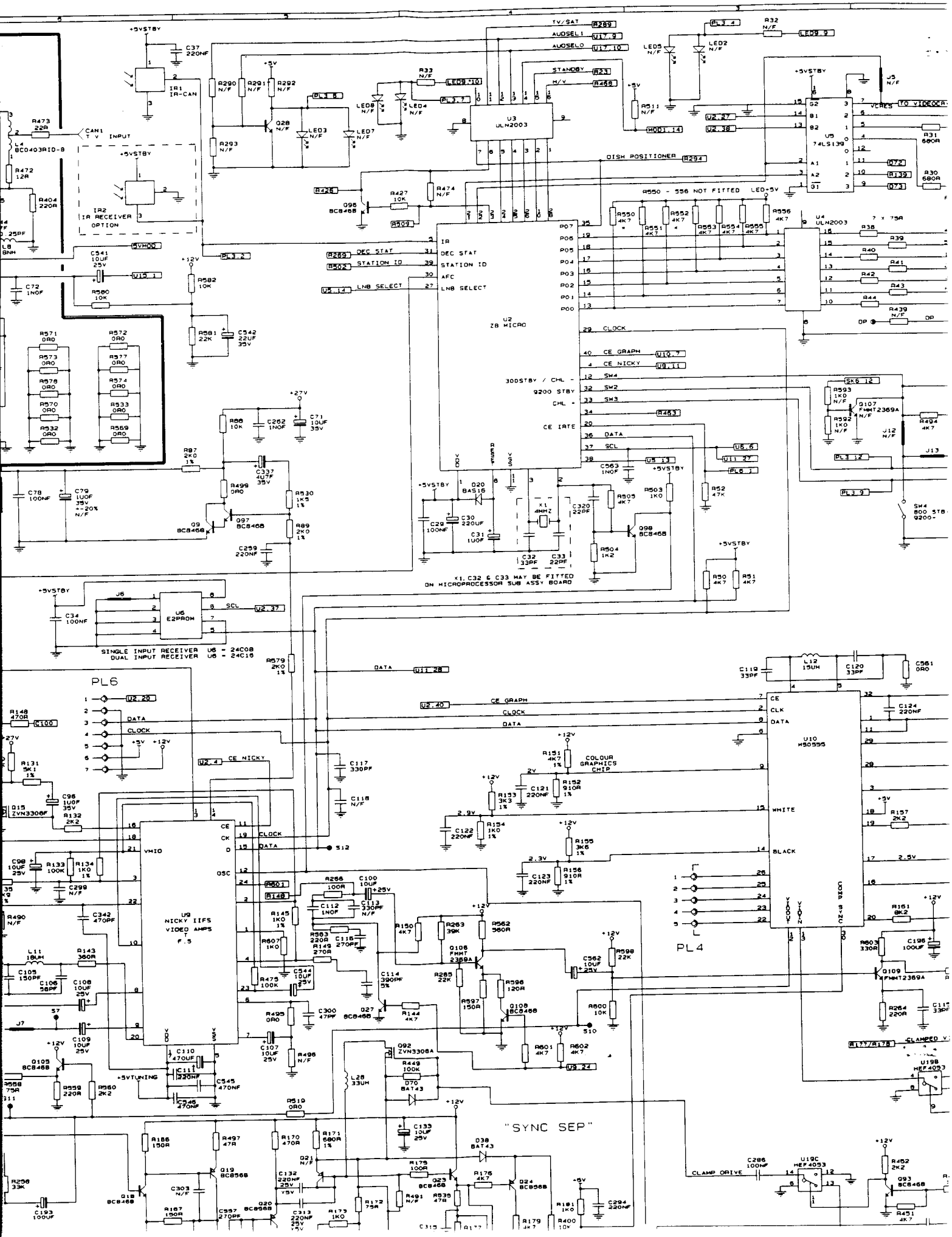
## PARTS FOR OFF-BOARD CARD READER

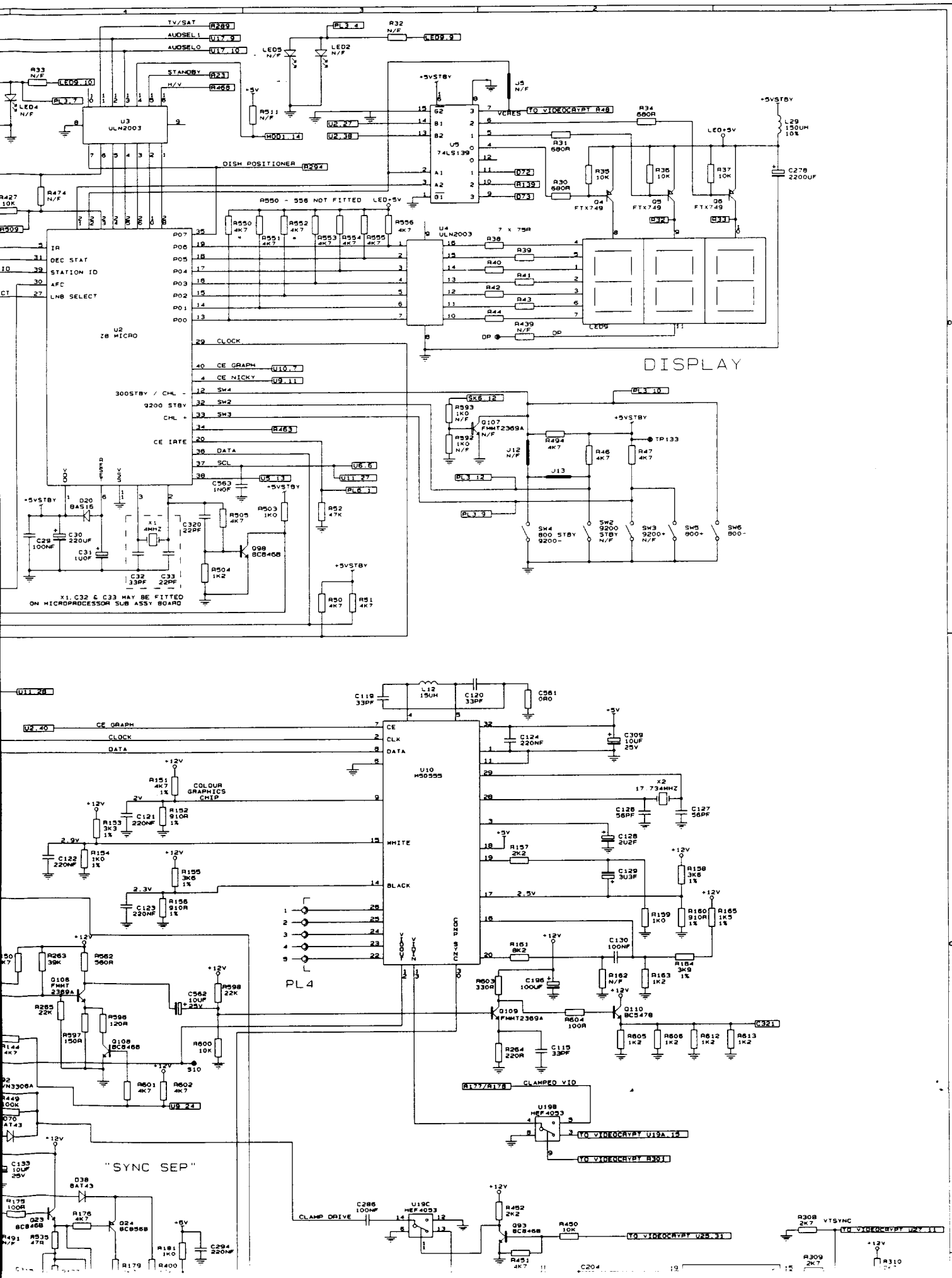
| | | |
|---|---|---|
| | PCB-CARD READER 800 SETRIES REV A1 | 181-0187101 |
| CARD5 | SMT CARD READER-ALCATEL7001LM0416T2F08 | 870-7001001 |
| SK1 | SOCKET 9-WAY | 161-2000900 |

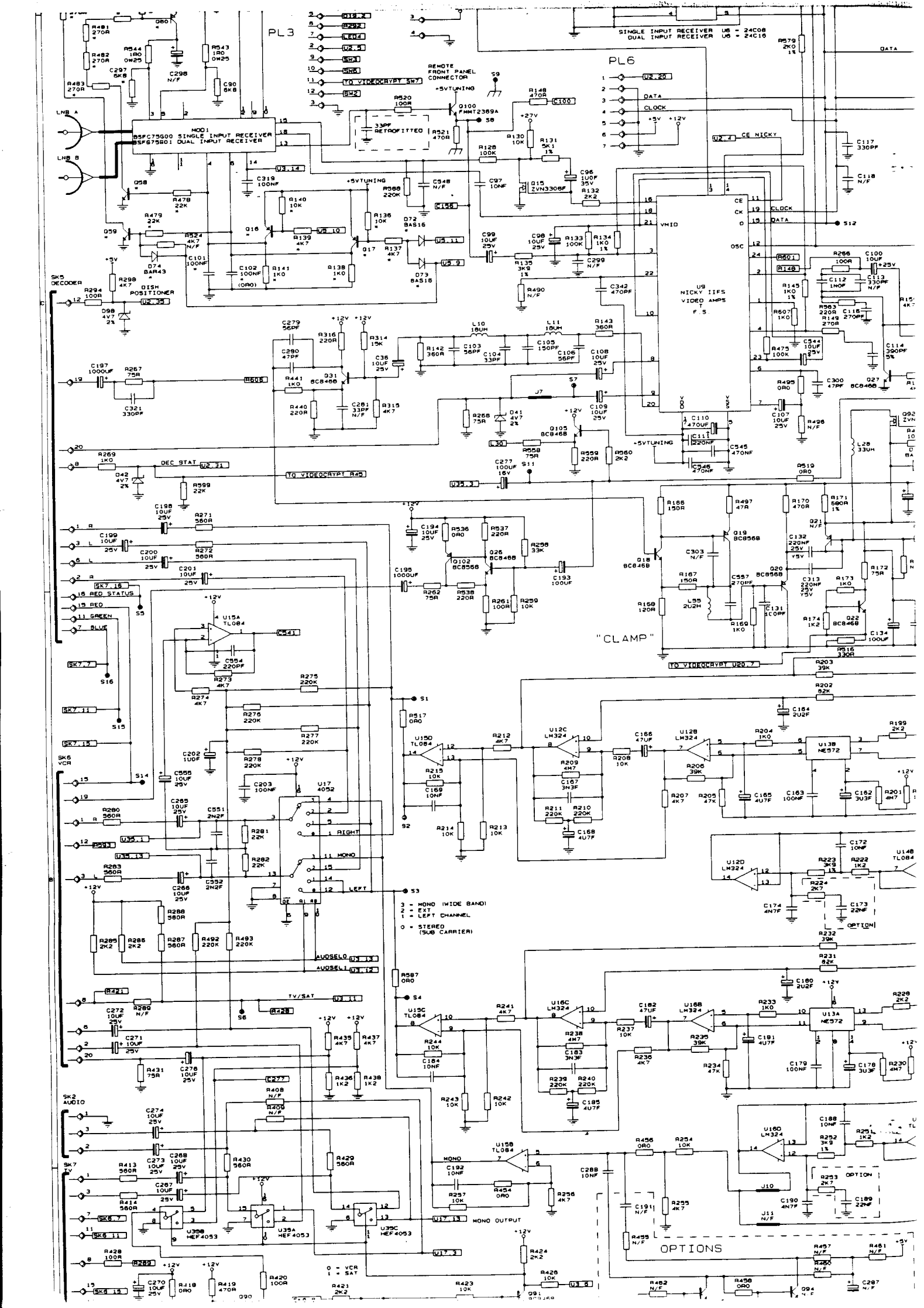
## MECHANICAL PARTS UNIQUE TO STU802/05M

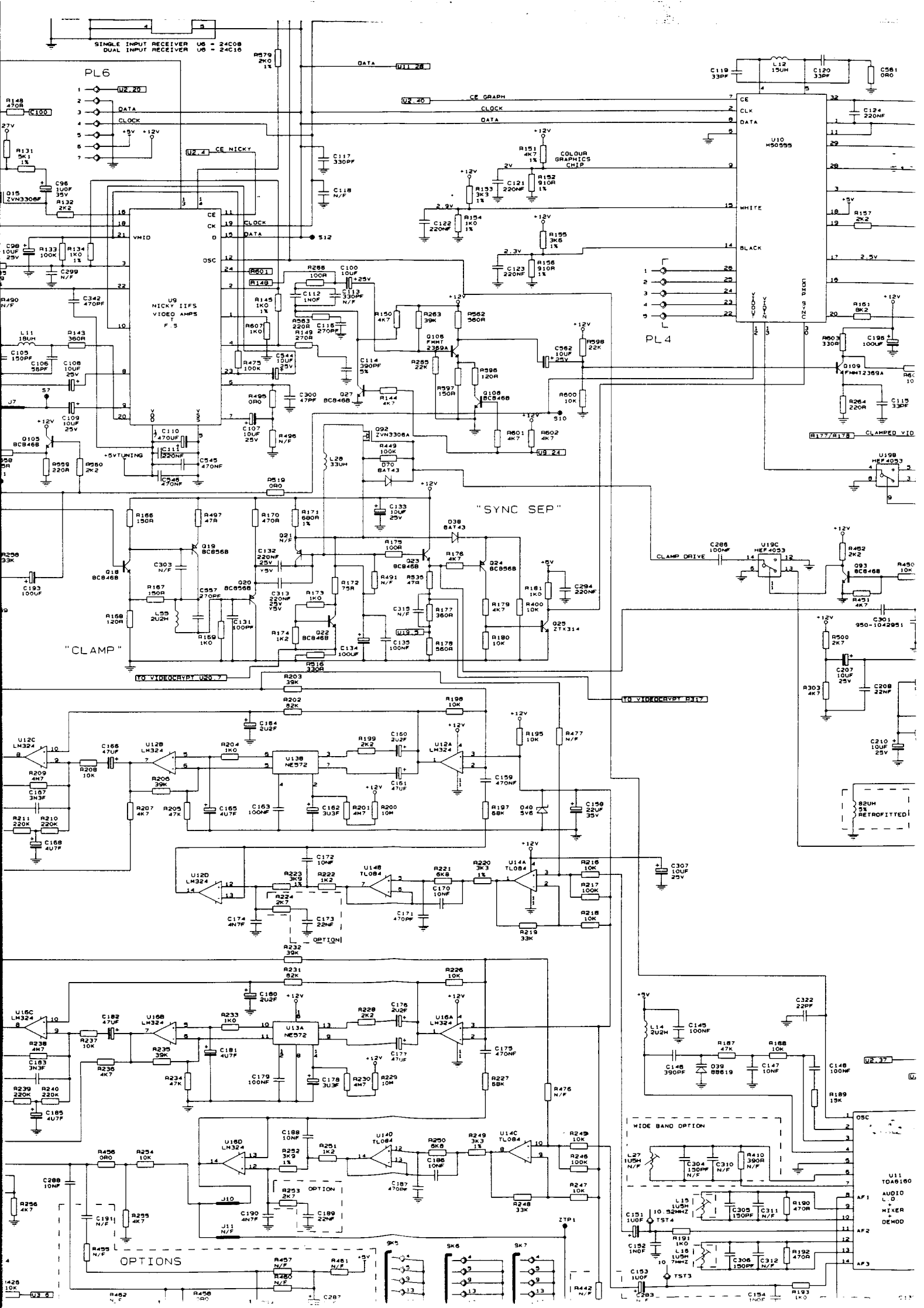
| | | |
|---|---|---|
| | RIBBON-SCRATCH/SOLVENT RESISTANT | 300-0328320 |
| | LABEL 76X121MM SILVER MET POLY 2 PART | 300-0761210 |
| 1 OFF | BASE-800 UNIV.PRE-COAT PRINT.(NON-PANDA) | 321-0800103 |
| 1 OFF | PHILIPS PRD800/SCC222 CARTON (WHITE) | 412-0378910 |
| 1 OFF | CARTON LABEL PHILIPS STU802/05M | 297-0300600 |
| 2 OFF | POLYSTYRENE 700/800/900 SERIES | 442-7890001 |
| 1 OFF | PHILIPS STU802/05M MANUAL | 502-0800030 |
| 1 OFF | PHILIPS STU802//05M HANDSET | 699-0800030 |
| 2 OFF | PLASTITE SCREW-4 X 1/4 POZI PAN BLACK | 245-4140011 |
| 1 OFF | COVER-700/800/900 SERIES (GREY) HITMET | 312-7890010 |
| 2 OFF | PILLAR-LCBS-14 (RICHCO) | 248-0014002 |
| 3 OFF | PILLAR-LCBS-12 V/CRYPT STAND-OFF(RICHCO) | 248-0012001 |
| 2 OFF | PILLAR-SP1-6-01 STAND-OFF (RICHCO) | 248-1601001 |
| 1 OFF | HALF NUT-3/8 FORM 32 TOI.2A | 240-1380011 |
| 1 OFF | "A" MAINS CABLE-UK "8" SS9000 | 191-1015280 |
| 1 OFF | BLANKING GROMMET FOR S/LNB OPTION | 306-7890000 |
| 1 OFF | CABLE-COAX UHF MALE TO FEMALE | 198-0015021 |
| 1 OFF | PRD/PSR PROG LISTING SHEET UNBRANDED | 504-1800000 |
| 1 OFF | PHILIPS BAR CODE LABEL 2 PT (627-0800030) | 297-0300700 |
| 1 OFF | PHILIPS STU802/05M FRONT PANEL PRINTED | 360-1800030 |

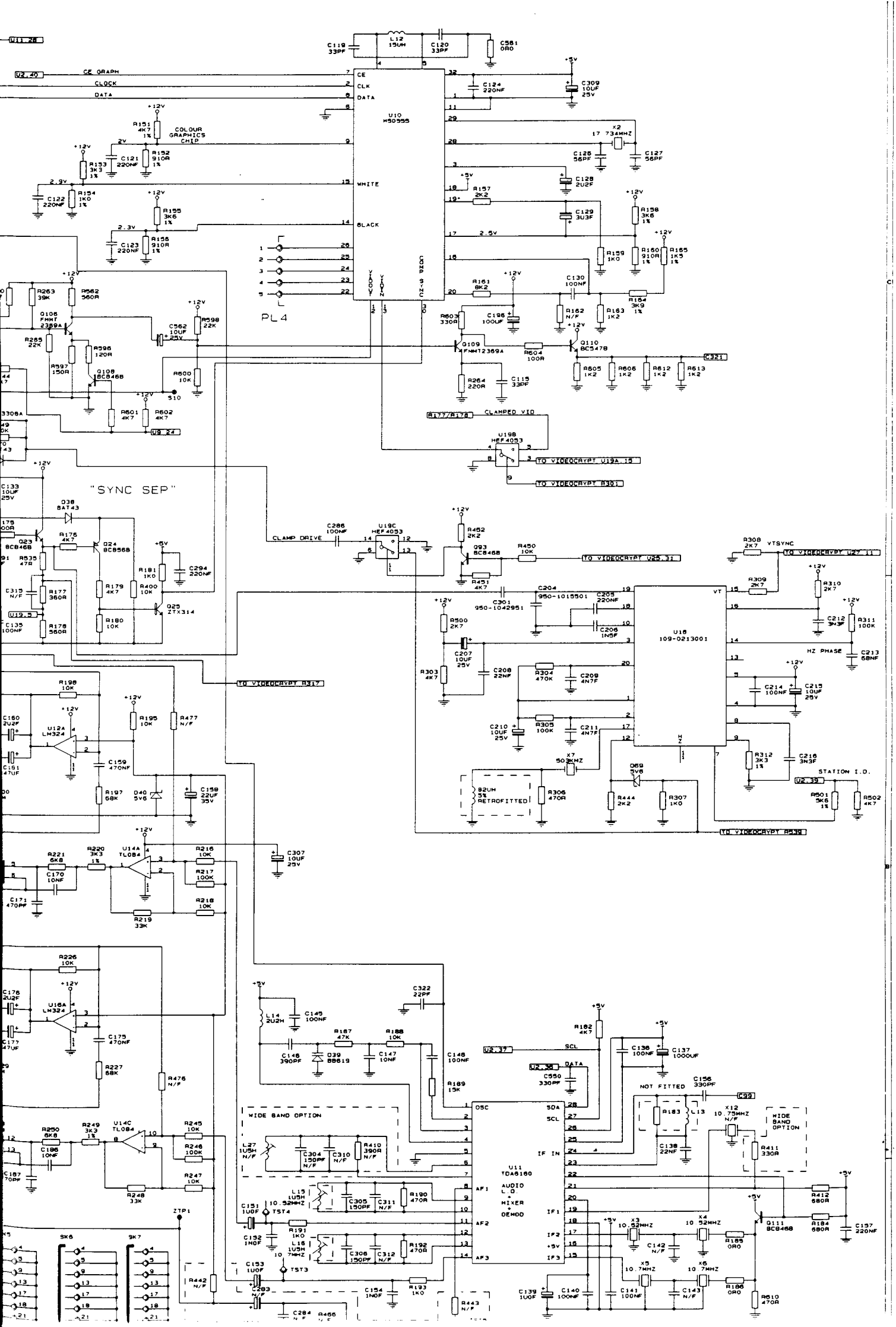

+12V
R934
0R0
+12V
C40
C56
C58
C57
+5VSTBY
C37
220NF
+5V

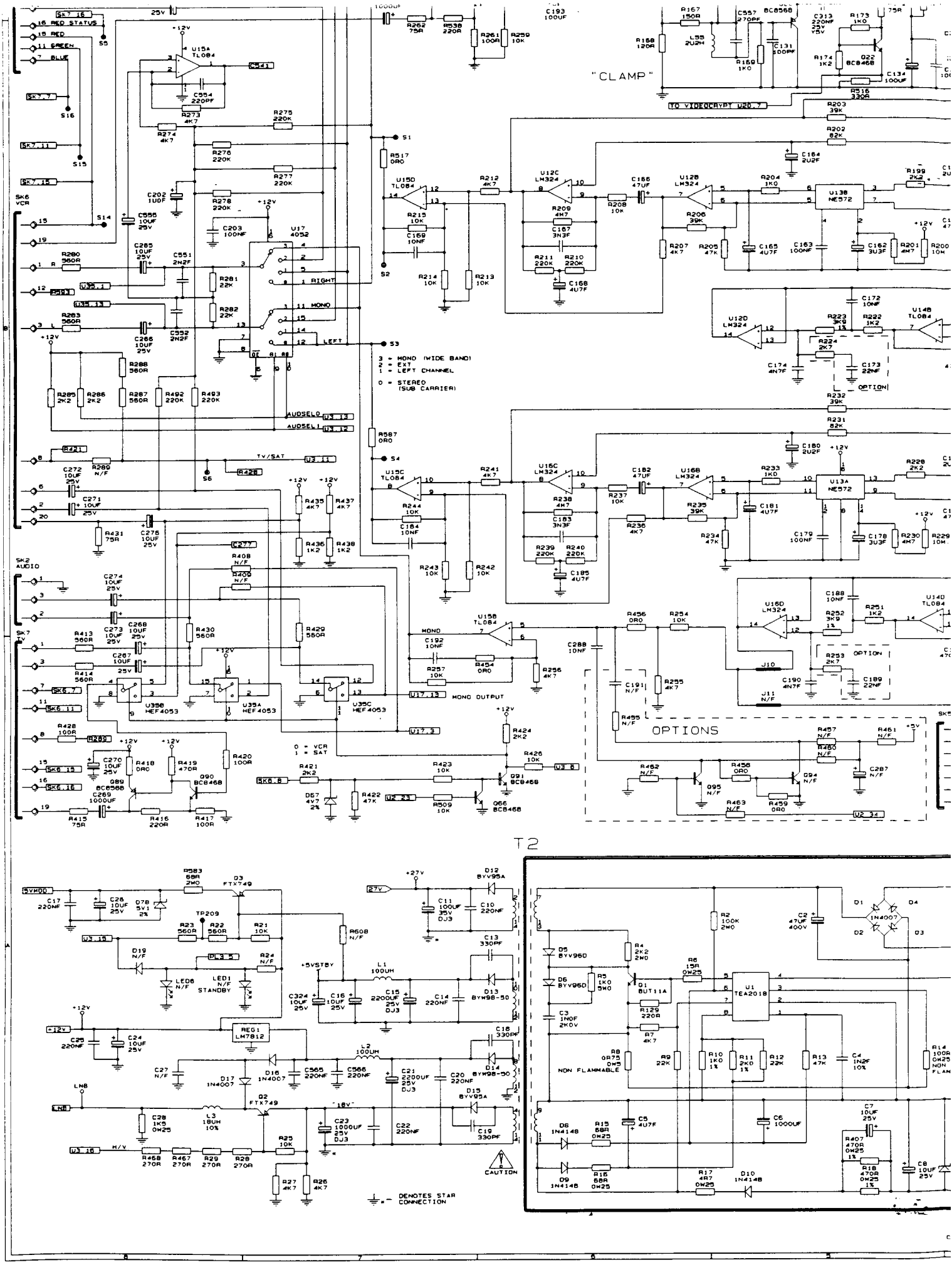

+5VSTBY
C37 220NF
IR1 IR-CAN
CAN1 T V INPUT
L4 BC0403RID-8
R473 22R
R472 12R
R404 220R
IR2 IR RECEIVER OPTION
+5VMOD
C541 10UF 25V
R580 10K
C72 1NOF
+12V
R582 10K
R581 22K
C542 22UF 35V
R571 0R0
R572 0R0
R573 0R0
R577 0R0
R576 0R0
R574 0R0
R570 0R0
R533 0R0
R532 0R0
R569 0R0
+27V
R86 10K
C262 1NOF
C71 10UF 35V
R87 2K0 1%
C337 407F 35V
R499 0R0
R530 1K5 1%
Q9 BC8468
Q97 BC8468
R89 2K0 1%
C259 220NF
C78 100NF
C79 1U0F 35V +-20% N/F
+5VSTBY
J6
U6 E2PROM
C34 100NF
SCL
U2.37
SINGLE INPUT RECEIVER U6 = 24C08
DUAL INPUT RECEIVER U6 = 24C16
R579 2K0 1%
PL6
U2.20
DATA
CLOCK
+5V +12V
U2.4 CE NICKY
R148 470R
C100
R131 5K1 1%
C96 1U0F 35V
Q15 ZVN3306F
R132 2K2
C98 10UF 25V
R133 100K
R134 1K0 1%
C299 N/F
C342 470PF
R490 N/F
L11 18UH
R143 360R
C105 150PF
C106 56PF
C108 10UF 25V
J7
C109 10UF 25V
Q105 BC8468
R559 220R
R560 2K2
+5VTUNING
U9 NICKY IIFS VIDEO AMPS T F.5
VMID
CE
CK
D
OSC
CLOCK
DATA
S12
C110 470UF
C111 220NF
C545 470NF
C546 470NF
R601
R148
R145 1K0 1%
R607 1K0
R475 100K
C544 10UF 25V
R495 0R0
C300 47PF
C107 10UF 25V
R496 N/F
R519 0R0
C117 330PF
C118 N/F
C112 1NOF
C113 330PF N/F
R149 270R
C115 270PF
R563 220R
R266 100R
C100 10UF +25V
C114 390PF 5%
Q27 BC8468
R144 4K7
R150 4K7
R263 39K
R562 360R
Q108 FMMT 2369A
R285 22K
R596 120R
R597 150R
Q106 BC8468
C562 10UF +25V
R598 22K
R600 10K
R601 4K7
R602 4K7
U9.24
Q92 ZVN3308A
R449 100K
D70 BAT43
L28 33UH
C133 10UF 25V
"SYNC SEP"
D38 BAT43
R179 100R
Q23 BC8468
R176 4K7
Q24 BC8568
R491 4K7
R935 47R
R181 1K0
C294 220NF
R400 10K
R186 150R
R497 47R
R170 470R
R171 680R 1%
Q21 N/F
C132 220NF 25V
Y5V
Q19 BC8568
Q18 BC8468
C303 N/F
R187 150R
C557 270PF
Q20 BC8568
C313 220NF 25V Y5V
R173 1K0
R172 75R
C315
R177
R236 33K
C193 100UF
TV/SAT R289
AUDSEL1 U17.9
AUDSEL0 U17.10
STANDBY R23
M/V R466
R33 N/F
LED9.10
PL3.7
PL3.6
R290 N/F
R291 N/F
R292 N/F
R293 N/F
Q28 N/F
LED8 N/F
LED4 N/F
LED3 N/F
LED7 N/F
U3 ULN2003
R511 N/F
MOD1.14
LED5 N/F
LED2 N/F
R32 N/F
LED9.9
PL3.4
+5VSTBY
J5 N/F
U5 74LS139
VCBES
TO VIDEOCR
U2.27
U2.38
R31 680R
R30 680R
Q72
R139
Q73
DISH POSITIONER R294
R425
R427 10K
R474 N/F
Q96 BC8468
R509
R550 - 556 NOT FITTED
LED+5V
R550 4K7
R551 4K7
R552 4K7
R553 4K7
R554 4K7
R555 4K7
R556 4K7
U4 ULN2003
7 x 75R
R38
R39
R40
R41
R42
R43
R44
R439 N/F
DP
U2 Z8 MICRO
IR
DEC STAT R289
STATION ID R502
AFC
LNB SELECT U5.14
P07
P06
P05
P04
P03
P02
P01
P00
CLOCK
CE GRAPH U10.7
CE NICKY U9.11
SW4
SW2
SW3
CE IRATE
DATA
SCL
U5.6
U5.13
U11.27
PL6.1
300STBY / CHL -
9200 STBY
CHL +
R463
C563 1NOF
+5VSTBY
R503 1K0
R505 4K7
R52 47K
D20 BAS16
C29 100NF
C30 220UF
C31 1U0F
X1 4MHZ
C320 22PF
C32 33PF
C33 22PF
Q98 BC8468
R504 1K2
R50 4K7
R51 4K7
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY BOARD
SK6 12
R593 1K0 N/F
Q107 FMMT2369A N/F
R592 1K0 N/F
R494 4K7
J12 N/F
J13
PL3.12
PL3.9
SW4 STB 9200-
DATA U11.28
U2.40 CE GRAPH
CLOCK
DATA
C119 33PF
L12 15UH
C120 33PF
C561 0R0
U10 H90355
CE
CLK
DATA
WHITE
BLACK
COLOUR GRAPHICS CHIP
R151 4K7 1%
R152 910R 1%
C121 220NF
R133 3K3 1%
R154 1K0 1%
C122 220NF
R155 3K6 1%
R156 910R 1%
C123 220NF
C124 220NF
R157 2K2
R161 8K2
R603 330R
C198 100UF
Q109 FMMT2369A
R264 220R
C115 33PF
R177/R178
CLAMPED V
U19B HEF4053
PL4
CLAMP DRIVE
C286 100NF
U19C HEF4053
R452 2K2
Q93 BC8468
R451 4K7

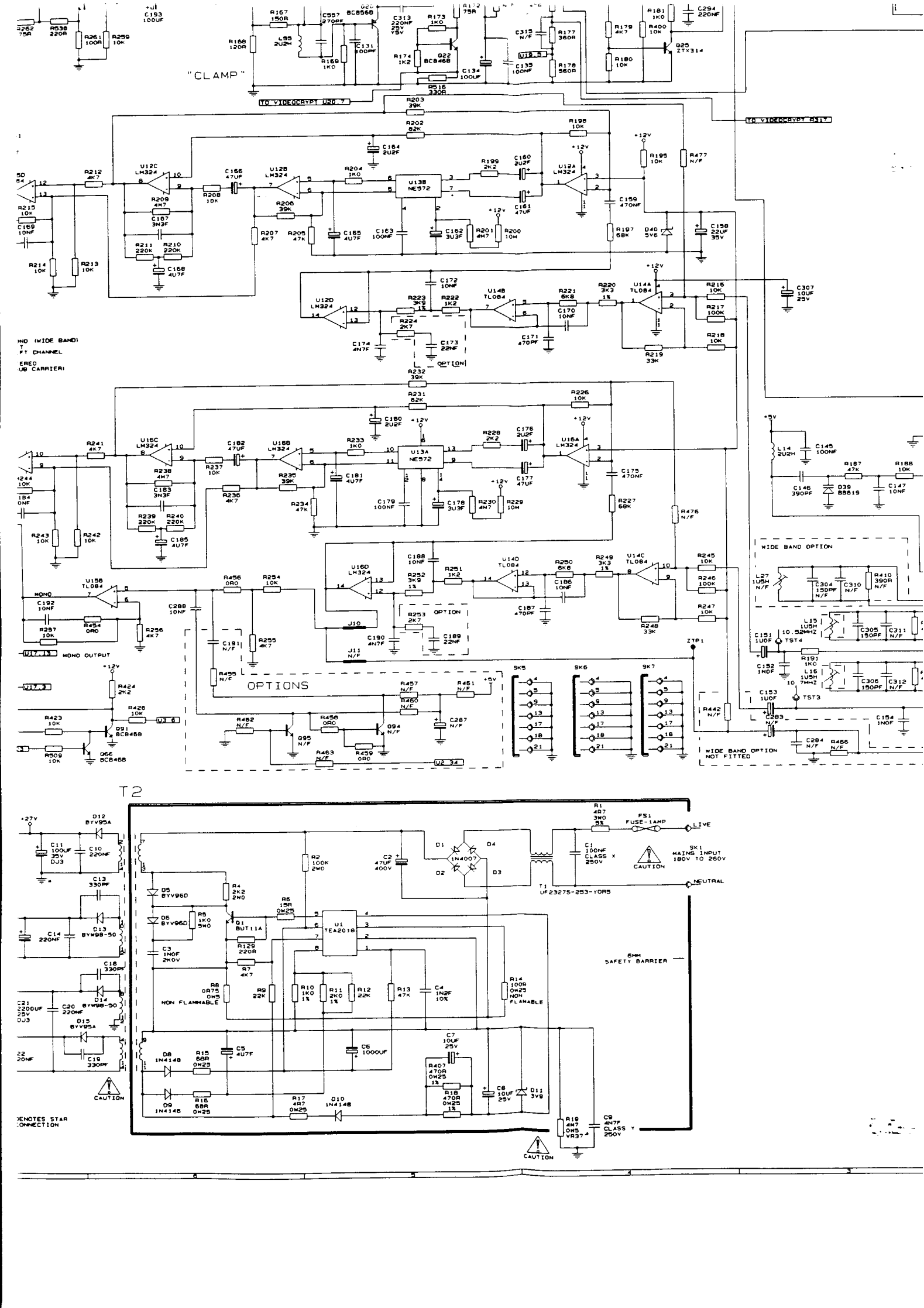

DISPLAY
"SYNC SEP"
PL4
U2 Z8 MICRO
U10 MS0355
U3 ULN2003
U4 ULN2003
U5 74LS139
U9 74HC4053
U19C HEF4053
U19B HEF4053
U19A HEF4053
X1 4MHZ
X2 17.734MHZ
DISH POSITIONER
CLAMP DRIVE
CLAMPED VID
VTSYNC
CE GRAPH
CLOCK
DATA
CE NICKY
CE IATE
IR
DEC STAT
STATION ID
AFC
LNB SELECT
CLOCK
SCL
SW2
SW3
SW4
SW5
SW6
CHL +
CHL -
9200 STBY
300STBY / CHL -
TV/SAT
AUOSEL1
AUOSEL0
STANDBY
H/V
LED+5V
+5VSTBY
TO VIDEOCRYPT R48
TO VIDEOCRYPT U19A.15
TO VIDEOCRYPT R301
TO VIDEOCRYPT U25.31
TO VIDEOCRYPT U27.11
COLOUR GRAPHICS CHIP
R550 - 556 NOT FITTED
X1, C32 & C33 MAY BE FITTED ON MICROPROCESSOR SUB ASSY BOARD
SW4 800 STBY 9200-
SW2 9200 STBY N/F
SW3 9200+ N/F
SW5 800+
SW6 800-

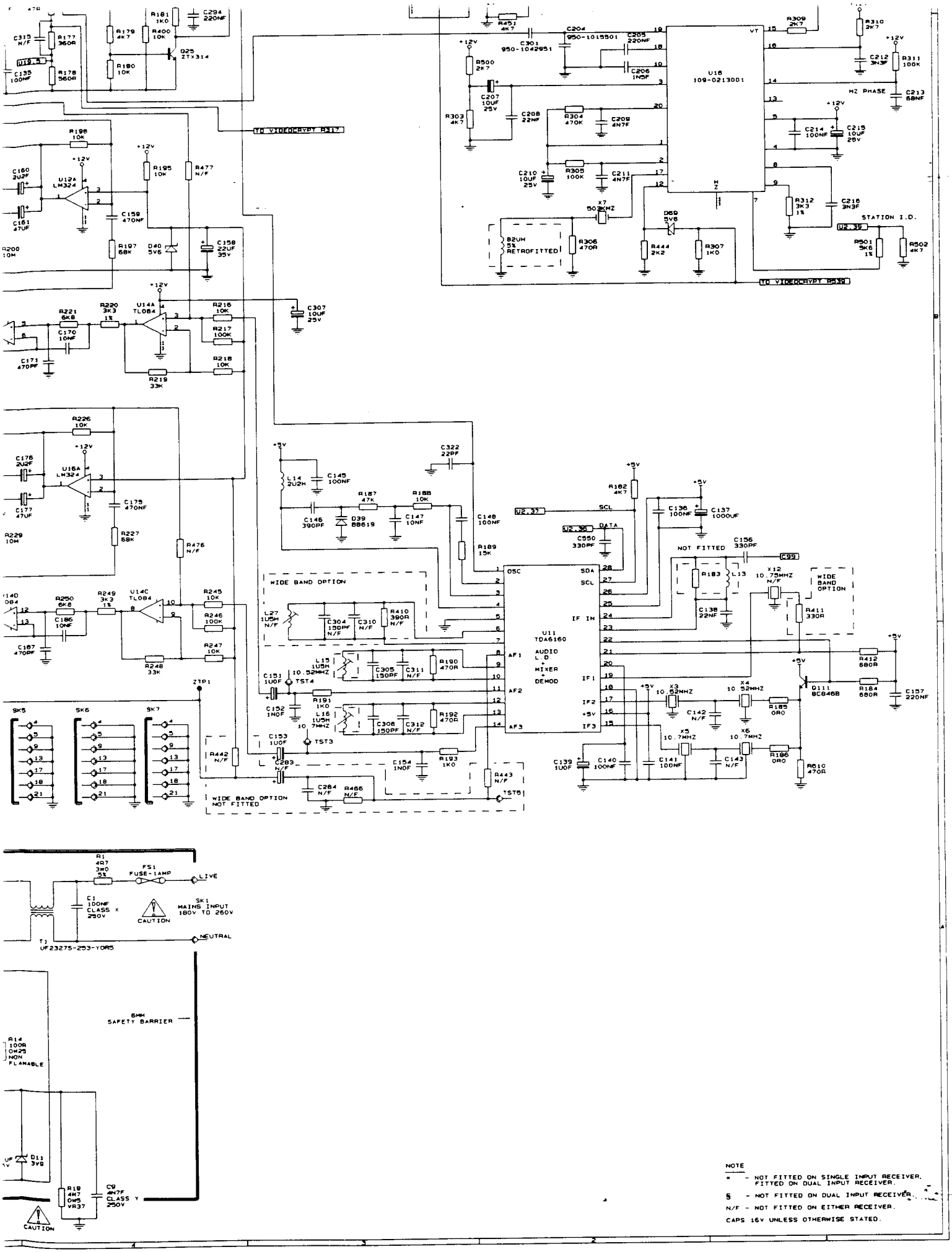

PL3
PL6
SINGLE INPUT RECEIVER U6 = 24C08
DUAL INPUT RECEIVER U6 = 24C16
REMOTE FRONT PANEL CONNECTOR
MOD1
BSF675G00 SINGLE INPUT RECEIVER
BSF675B01 DUAL INPUT RECEIVER
LNB A
LNB B
+5VTUNING
U9 NICKY IIFS VIDEO AMPS
VMID
OSC
CE
CK
D
DATA
CLOCK
U2.4 CE NICKY
SK5 DECODER
DISH POSITIONER
DEC STAT U2.31
TO VIDEOCRYPT R45
TO VIDEOCRYPT SW7
TO VIDEOCRYPT U20.7
"CLAMP"
SK7.16 16 RED STATUS
15 RED
11 GREEN
7 BLUE
SK7.7
SK7.11
SK7.15
SK6 VCR
SK2 AUDIO
SK7 TV
U15A TL084
U15B TL084
U15C TL084
U15D TL084
U16A LM324
U16B LM324
U16C LM324
U16D LM324
U17 4052
U35A HEF4053
U35B HEF4053
U35C HEF4053
U13A NE572
U13B NE572
U14A TL084
U14B TL084
RIGHT
MONO
LEFT
AUDSEL0
AUDSEL1
TV/SAT
MONO OUTPUT
3 = MONO (WIDE BAND)
2 = EXT
1 = LEFT CHANNEL
0 = STEREO (SUB CARRIER)
0 = VCR
1 = SAT
OPTION
OPTIONS


SINGLE INPUT RECEIVER U8 = 24C08
DUAL INPUT RECEIVER U8 = 24C16
PL6
PL4
U9
NICKY IIFS
VIDEO AMPS
F.S
U10
M50955
COLOUR
GRAPHICS
CHIP
"SYNC SEP"
"CLAMP"
CLAMP DRIVE
OPTION
OPTIONS
WIDE BAND OPTION
U11
TDA6160
AUDIO
L.O
MIXER
DEMOD
U138
NE572
U13A
NE572
U19C
HEF4053
U19B
HEF4053
U19A
HEF4053
U198
HEF4053
DATA
CLOCK
CE GRAPH
CE NICKY
VIDEOCRYPT
82UH
5%
RETROFITTED


U11.28
L12 15UH
C119 33PF
C120 33PF
C581 0R0
U2.40
CE GRAPH
CLOCK
DATA
U10 M50555
COLOUR GRAPHICS CHIP
C124 220NF
C309 10UF 25V
X2 17.734MHZ
C128 56PF
C127 56PF
C128 2U2F
C129 3U3F
R151 4K7 1%
R152 910R 1%
R153 3K3 1%
C121 220NF
R154 1K0 1%
C122 220NF
R155 3K6 1%
R156 910R 1%
C123 220NF
R157 2K2
R158 3K6 1%
R159 1K0
R160 910R 1%
R165 1K5 1%
R161 8K2
C130 100NF
R162 N/F
R163 1K2
R164 3K9 1%
R603 330R
C196 100UF
Q109 FMMT2369A
Q110 BC5478
R604 100R
C321
R605 1K2
R606 1K2
R612 1K2
R613 1K2
R264 220R
C115 33PF
PL4
R263 39K
R562 360R
Q106 FMMT 2369A
R598 22K
C562 10UF 25V
R265 22K
R596 120R
R597 150R
Q108 BC8468
R600 10K
S10
R601 4K7
R602 4K7
U9.24
R177/R178
CLAMPED VID
U19B HEF4053
TO VIDEOCRYPT U19A.15
TO VIDEOCRYPT R301
"SYNC SEP"
C133 10UF 25V
D38 BAT43
Q23 BC8468
R175 4K7
Q24 BC8568
R635 47R
C315 N/F
R177 360R
U19.5
C135 100NF
R178 560R
R181 1K0
R400 10K
C294 220NF
R179 4K7
R180 10K
Q25 ZTX314
C286 100NF
U19C HEF4053
CLAMP DRIVE
R452 2K2
Q93 BC8468
R450 10K
TO VIDEOCRYPT U25.31
R451 4K7
R308 2K7
VTSYNC
TO VIDEOCRYPT U27.11
R309 2K7
R310 2K7
C204 950-1015501
C205 220NF
C301 950-1042951
C206 1N5F
R500 2K7
C207 10UF 25V
C208 22NF
R303 4K7
U18 109-0213001
VT
HZ PHASE
C212 3N3F
R311 100K
C213 68NF
R304 470K
C209 4N7F
C214 100NF
C215 10UF 25V
C210 10UF 25V
R305 100K
C211 4N7F
X7 503.4MHZ
82UH 5% RETROFITTED
R306 470R
D59 5V6
R444 2K2
R307 1K0
R312 3K3 1%
C216 3N3F
STATION I.D.
U2.39
R501 5K6 1%
R502 4K7
TO VIDEOCRYPT R317
R198 10K
U12A LM324
R195 10K
R477 N/F
C160 2U2F
C161 47UF
C159 470NF
R197 68K
D40 5V6
C158 22UF 35V
C307 10UF 25V
R221 6K8
R220 3K3 1%
U14A TL084
R216 10K
R217 100K
C170 10NF
C171 470PF
R218 10K
R219 33K
R226 10K
U16A LM324
C176 2U2F
C177 47UF
C175 470NF
R227 68K
R476 N/F
C322 22PF
L14 2U2H
C145 100NF
R187 47K
R188 10K
C148 390PF
D39 BB619
C147 10NF
C146 100NF
R189 15K
R250 6K8
R249 3K3 1%
U14C TL084
R245 10K
R246 100K
C186 10NF
C187 470PF
R247 10K
R248 33K
ZTP1
WIDE BAND OPTION
L27 1U5H N/F
C304 150PF N/F
C310 N/F
R410 390R N/F
L15 1U5H 10.52MHZ
C305 150PF
C311 N/F
R190 470R
C131 1U0F
TST4
R191 1K0
L16 1U5H 10.7MHZ
C306 150PF
C312 N/F
R192 470R
C132 1N0F
C153 1U0F
TST3
C283 N/F
C284 N/F
R466
R442 N/F
C154 1N0F
R193 1K0
R443 N/F
SK6
SK7
U11 TDA6160 AUDIO L.O. + MIXER + DEMOD
OSC
AF1
AF2
AF3
SDA
SCL
IF IN
IF1
IF2
IF3
+5V
R182 4K7
U2.37
SCL
U2.38
DATA
C550 330PF
C138 100NF
C137 1000UF
NOT FITTED
C156 330PF
C99
R183
L13
X12 10.75MHZ N/F
WIDE BAND OPTION
C138 22NF
R411 330R
X3 10.52MHZ
X4 10.52MHZ
R412 680R
Q111 BC8468
R184 680R
C157 220NF
C142 N/F
R185 0R0
X5 10.7MHZ
X6 10.7MHZ
R186 0R0
C139 1U0F
C140 100NF
C141 100NF
C143 N/F
R610 470R


"CLAMP"
OPTIONS
OPTION
MONO OUTPUT
3 = MONO (WIDE BAND)
2 = EXT
1 = LEFT CHANNEL
0 = STEREO (SUB CARRIER)
0 = VCR
1 = SAT
DENOTES STAR CONNECTION
CAUTION
T2


"CLAMP"
TO VIDEOCRYPT U20.7
TO VIDEOCRYPT U17
OPTION
OPTIONS
WIDE BAND OPTION
WIDE BAND OPTION NOT FITTED
MONO OUTPUT
T2
U1 TEA2018
FS1 FUSE-1AMP
SK1 MAINS INPUT 180V TO 260V
LIVE
NEUTRAL
CAUTION
6MM SAFETY BARRIER
NON FLAMMABLE




NOTE

* - NOT FITTED ON SINGLE INPUT RECEIVER. FITTED ON DUAL INPUT RECEIVER.

§ - NOT FITTED ON DUAL INPUT RECEIVER.

N/F - NOT FITTED ON EITHER RECEIVER.

CAPS 16V UNLESS OTHERWISE STATED.